U. S. Government

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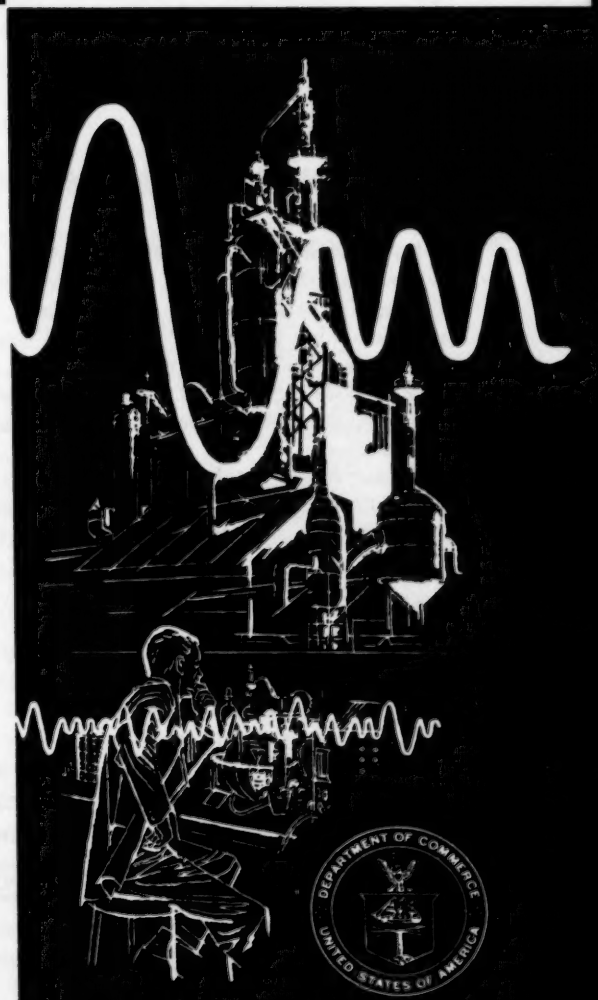

U. S. DEPARTMENT OF COMMERCE

Office of Technical Services

U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
Donald A. Schon, *Director*

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Cincinnati, Ohio 45200

Detroit Public Library
Detroit, Michigan 48200

University of Utah
Salt Lake City, Utah 84100

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Volume 37	Semi-annual Cumulative Index January - June 1962 Includes both Technical Abstract Bulletin (TAB) and "Non-Military and Older Military Reports" sections.	$3.50
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Volume 38	Collective Index 1 January - 1 May 1963 Includes Technical Abstract Bulletin only.	$3.50

For information regarding the availability of earlier indexes write to Office of Technical Services, U. S. Department of Commerce, Washington, D. C. 20230.

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-429 747 Div. 1
OTS price $1.60

Bureau of Naval Weapons, Navy Dept., Washington, D. C.
STUDY OF CARRIER AIRCRAFT RECOVERY FROM 20,000 FEET TO ARRESTMENT DURING NIGHT OR ALL WEATHER CONDITIONS,
by Ray E. Davis. 19 Apr 61, 14p.
Unclassified report

Descriptors: (*Naval aircraft, Carrier landings), Carrier-controlled approach radar, Recovery, Aviation safety, All-weather aviation, Jet planes, Aircraft carriers, Night flight, Flight paths, Radio navigation, Ultrahigh frequency, Aviation accidents.

A study is made of carrier aircraft recovery from 20,000 feet to arrestment during night or all weather conditions. (Author)

AD-429 804 Div. 1
OTS price $6.60

Douglas Aircraft Co., Inc., Long Beach, Calif.
TRAILING VORTICES OF JET TRANSPORT AIRCRAFT DURING TAKEOFF AND LANDING.
Final rept.,
E. L. Zwieback. Jan 64, 42p. Rept. no. RD64 3
Contract FA WA4306, Proj. 101 24R
Unclassified report

Descriptors: (*Jet transport planes, Vortices), (*Wake, Jet planes), (*Aviation safety, Wake), Take-off, Airplane landings, Wings, Instrumentation, Civil aviation, Smoke generators, Test methods, Range (Distance), Time, Measurement, Commercial planes.

The movement and strengths of wing trailing vortices of the Douglas DC-8 jet transport aircraft were measured during takeoff and landing approach. The effect of the ground plane and ambient winds on the movement and strength decay was investigated. The results are compared with a modified potential flow theory. The position of the trailing vortices near the ground is extremely sensitive to low level ambient winds and vertical gradients of the wind. The measured positions of the trailing vortices indicate probable correlation with the potential flow theory with noted exceptions to the assumptions used. Measured vortex velocity decay rates are comparable to a modified theoretical free vortex viscous decay. Distinct vortex velocity fields were observed near the ground, using a smoke generator technique, for periods up to 65 seconds after aircraft passage. No differences in the trailing vortex system of two rolled-up vortices were observed for both the takeoff and landing configurations of the DC-8 aircraft. (Author)

AD-429 840 Div. 1
OTS price $1.10

Naval Air Test Center, Patuxent River, Md.
FLIGHT TEST AND EVALUATION OF BENDIX PIONEER CENTRAL PRECISION SERVOED TYPE NO. 1592 ALTIMETER.
Interim rept. no. 1,
by C. M. Baker and H. G. Heininger. 8 Jan 64, 2p.
Task RAV09P003
NATC ST32 IR64 Unclassified report

Descriptors: (*Altimeters, Performance (Engineering)), Jet fighters, Flight testing, Maintenance, Errors, Hydraulic systems, Hydraulic fluids, Pitot tubes, Rupture.

Evaluation of the altimeter installed in a TF-9J commenced on 14 November 1963. After a total of 7.6 project hours, the plane was put in major check, during which foreign object damage to the engine was discovered. On 17 December 1963 the hydraulic pressure line was inadvertently coupled with the static system line at the airplane tail quick disconnect. As a result of this maintenance error, hydraulic fluid flowed into the pitot-static instruments during turnup. The altimeter case was approximately half filled with hydraulic fluid indicating aneroid rupture and possibly additional damage. (Author)

AD-429 843 Div. 1
OTS price $1.10

Naval Air Test Center, Patuxent River, Md.
TESTS OF REWORKED SH-3A TAILPIPE.
Project situation rept.,
by T. A. Cobb and K. B. Tamai. 27 Jan 64, 2p.
Task RA1200001
NATC ST33 13R64 Unclassified report

Descriptors: (*Helicopter, Exhaust pipes), (*Exhaust pipes, Helicopters), Flight testing, Installation, Maintenance.

The project tailpipe was installed in SH-3A BuNo 148044. On 15 January the tailpipe had accumulated a total of 362.6 hours. No further extension of the crack cited in project situation report of 19 September 1963 has occurred. (Author)

AD-429 971 Div. 1
OTS price $7.00

American Power Jet Co., Ridgefield, N. J.
PERFORMANCE OF AND DESIGN CRITERIA FOR DEPLOYABLE AERODYNAMIC DECELERATORS.
Dec 63, 538p.
Contract AF33 616 8112, Proj. 6065, Task 606503
ASD TR61 579 Unclassified report

Descriptors: (*Parachutes, Research program administration), (*Drag parachutes, Design), Handbooks, Deceleration, Parachute fabrics, Parachute descents, Air drop operations, Aerodynamic characteristics, Drag, Aerospace craft, Test equipment, Containers, Textiles, Reliability, Loading (Mechanics), Space capsules, Instrumentation, Materials, Test methods, Performance (Engineering).

Division 1 - AIRCRAFT AND FLIGHT EQUIPMENT

AD-430 012 Div. 1, 28
OTS price $12.50

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
FIXED-BASE SIMULATOR INVESTIGATION OF THE EFFECTS OF L ALPHA AND TRUE SPEED ON PILOT OPINION OF LONGITUDINAL FLYING QUALITIES,
by Charles R. Chalk. Nov 63, 174p.
Contract AF33 657 7442, Proj. 8219, Task 821905
ASD TDR63 399 Unclassified report

Descriptors: (*Airplanes, Elevators), (*Elevators, Pilots), (*Pilots, Reaction (Psychology)), Flight simulators, Performance (Engineering), Fighters, Bombers, Turbulence, Acceleration, Lift, Tests, Flight speeds, Simulation, Functions, Gusts, Angle of attack.

The study is directed toward investigating the effects on pilots rating of large variations (L alpha) in the relative amplitude and phase of the basic airplane responses to elevator control. The effects of L alpha and true speed on longitudinal flying qualities, optimum control gain, and normal acceleration response to turbulence were investigated in a ground simulator. The steady state ratio of normal acceleration to angle of attack was found to be of significance both to the flying qualities of an airplane and to the optimum longitudinal control gain. Normal acceleration response to rough air was demonstrated to be primarily a function of L alpha and the short period frequency and damping ratio. (Author)

AD-430 063 Div. 1
OTS price $13.00

Douglas Aircraft Co., Inc., Long Beach, Calif.
A STUDY OF ROUGH-TERRAIN-INDUCED STRUCTURAL LANDING LOADS.
Dec 63, 181p.
Contract DA44 177tc735, Task 1D121401A14602
ATRECOM TR63 68 Unclassified report

Descriptors: (*Airplane landings, Loading (Mechanics)), (*Short take-off planes, Airplane landings), Structures, Weight, Terrain, Landing gear, Landing impact.

An investigation was made of the effect of rough terrain on the loads, weights, and performance of the OV-1 airplane during landings. The load calculations, which were conducted on an IBM 7090 computer, considered the internal operating mechanism of the landing gear and the flexibilities of the gear and structure as a mutually interacting dynamic system. The equations of motion and certain details of the computer program are provided. A determination was made of the terrain roughness at which modification to the airplane was considered necessary and the terrain roughness at which the reduced performance of the OV-1 airplane, due to increased weight, became equal to or inferior to a VTOL aircraft of equal weight. This work was concerned with the determination of maximum loads and corresponding weight and performance penalties; however, observations were made regarding the importance of repeated loads during landing or taxiing on surfaces with multiple irregularities. The primary results of the investigation show the terrain roughness at which structural reinforcement is considered necessary and the terrain roughness at which the performance of the airplane becomes equal to that of a VTOL aircraft of the same weight. (Author)

AD-430 321 Div. 1
OTS price $3.60

General Dynamics, Fort Worth, Tex.
MECHANICAL - TIRE RUB STRIP - DETERMINATION OF WEAR CHARACTERISTICS,
by T. E. Holt. 15 Jan 64, 35p. Rept. no.. FGT2735
Contract AF33 657 11214
Unclassified report

Descriptors: (*Landing gear, Protective covering), (*Land gear doors, Wear resistance), Aircraft tires, Protective treatments, Rotation, Friction, Failure (Mechanics), Tests, Glass textiles, Aluminum, Halocarbon plastics, Materials, Test equipment, Temperature, Abrasion.

Tests were conducted to determine a suitable rub-strip pad to protect the main landing gear doors and other portions of the wheel well when contacted by a spinning tire such as encountered on take-off procedures and to provide data for possible main landing gear modifications. (Author)

AD-430 480 Div. 1, 27
OTS price $1.10

Naval Air Test Center, Patuxent River, Md.
EVALUATION OF THE SCINTILLA DIVISION, BENDIX FLAMEOUT DETECTOR IN F-8 AIRCRAFT,
Rept. no. 3 (Final),
18 Feb 64, 3p.
Task RA1200001
NATC ST32 22R64 Unclassified report

Descriptors: (*Flameout, Warning systems), Performance (Engineering), Flight testing, Turbojet engines, Naval aircraft, Jet fighters, Electric switches, Embedding substances, Vibration, Erosion.

Test were conducted to evaluate a flameout detector for reliability in the F-8D airplane (J57-P-20 engine) to substantiate a material change in the detector microswitch housing and to establish igniter electrode erosion rate under mormal operating conditions. Prototype flameout detector S/N X-0256 was used with the following modification: The ceramic microswitch housing was replaced with a lightweight plastic housing. The entire area surrounding the microswitch housing was filled with potting compound to reduce vibration amplitude. The modified flameout detector is recommended for use in the F-80 aircraft. (Author)

AD-430 566 Div. 1, 33, 30, 18
OTS price $4.60

Tactical Air Command, Langley AFB, Va.
OPERATIONAL TEST AND EVALUATION, C-130 RAMP UNLOADING KIT.
Final rept.,
by William S. Druyan, Herbert K. Pedersen and Sven E. Wallin. Feb 64, 42p.
TAC TR63 49 Unclassified report

Descriptors: (*Transport planes, Loading (Mechanics)), Pallets, Design, Correction, Handling, Acceptability, Test methods, Installation, Cargo, Air transportation, Logistics, Performance (Engineering), Conveyors, Environmental tests.

The A/B32H-4 C-130 Ramp Kit provides a means for discharging palletized cargo from the rear of the

C-130 aircraft when terminal facility type equipment is not available. Modifications are required to improve the reliability of the kit as presently designed. The ramp kit, with five pans, is too heavy and cumbersome for two individuals to handle and is considered too sophisticated for a tactical requirement. A bridging device permitting the unloading of palletized cargo onto the ground is considered sufficient. (Author)

AD-430 771 Div. 1
OTS price $6.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
HELICOPTER TRUE AIRSPEED SYSTEM MODEL 568T1.
Final rept.,
by E. T. Skelly. 28 Sep 62, 68p. Rept. no. 1H1470F3
Contract NOa(s)60 0194c
Unclassified report

Descriptors: (*Airspeed indicators, Helicopters), Rotor blades (Rotary wings), Instrumentation, Electrical equipment.

A description is given of the Model 568T1 helicopter airspeed system. Also included are the theory of operation, general installation instructions, and alignment procedure for the airspeed system. Five Model 568T1 helicopter airspeed systems, designed for operational use, are being supplied for flight evaluation. The airspeed system is substantially electrical and is based, in principle, on the continuous measurement of the variation in a rotor blade tip speed relative to the surrounding air. The variation in blade tip speed is measured and utilized to simultaneously present true airspeed on two airspeed indicators - one indicating true airspeed along the longitudinal axis of the helicopter, the other indicating true airspeed along the lateral axis of the helicopter. The systems are designed to supersede a previous instrument whose flight testing, on a type XHO3S-2 helicopter, substantiated the basic theory. Each one of the five Model 568T1 airspeed systems is mechanically designed and electrically adjusted for use on a specific type of helicopter; type HSS-1, HSS-2, HR2S, HU2K, or HUP3. The five Model 568T1 airspeed systems were laboratory tested. Flight evaluation of the systems should show that they are suited for operational use. (Author)

AD-430 820 Div. 1, 8, 20
OTS price $3.50

International Business Machines Corp., Owego, N. Y.
EXPERIMENTAL PROGRAM TO DETERMINE THE FEASIBILITY OF USING ANALYTICAL TECHNIQUES IN ANALYZING RADIATION EFFECTS TO FLIGHT CONTROL SYSTEMS.
Final rept., 1 Apr 62-30 Aug 63.
30 Sep 63, 214p. Rept. no. 63 521 21
Contract AF33 657 8104, Proj. 8222, Task 822205
RTD TDR63 4147 Unclassified report

Descriptors: (*Flight control systems, Radiation damage), (*Radiation damage, Adaptive control systems), Circuits, Aircraft equipment, Electronic equipment, Navigation computers, Amplifiers, Servo amplifiers, Band-pass amplifiers, Analog computers, Simulation, Gain, Degradation, Transistors, Wiring diagrams, Rocket planes, Airborne.

The effects of pulsed and steady-state nuclear radiation were determined for an advanced flight control system. Experimental studies of selected circuits are described. The objectives were to experimentally measure circuit and component changes, to modify these circuits to improve their radiation tolerance, and to compare the experimental results with theoretical analyses. Five circuits were studied in two series of radiation tests at the Sandia Pulsed Reactor facility. Experimental data were shown to be consistent with theoretical interpretation based on analysis of circuit operation and effects in the individual components. (Author)

AD-430 833 Div. 1, 9, 7, 30
OTS price $4.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
LABORATORY TESTING OF MODEL 568T1 HELICOPTER AIRSPEED SYSTEMS,
by E. T. Skelly. 28 Sep 62, 40p. Rept. no. 1H1470F1
Contract NOas60 0194c
Unclassified report

Descriptors: (*Airspeed indicators, Helicopters), (*Rotor blades (Rotary wings), Airspeed), Helicopter rotors, Model tests, Laboratories, Aerodynamic characteristics, Electrical equipment, Design, Environmental tests, Calibration, Test equipment.

Laboratory testing of five Model 568T1 helicopter airspeed systems shows that they are capable of measuring helicopter true airspeed over the operating speed range of the helicopter. The system is substantially electrical and is based on the continuous measurement of the variation in a rotor blade tip speed relative to the surrounding air. The variation in blade tip speed is measured and utilized to simultaneously present true airspeed on two airspeed indicators - one indicating true airspeed along the longitudinal axis of the helicopter - the other indicating true airspeed along the lateral axis of the helicopter. The systems were designed to supersede a previous instrument whose flight testing, on a XHO3S-2 type helicopter, substantiated the basic theory. Each one of the five Model 568T1 airspeed systems was mechanically designed and electrically adjusted for use on a specific type of helicopter; type HSS-1, HSS-2, HR2S, HU2K-1, or HUP3. Laboratory testing gives promise that the flight testing of the systems will show that they are suited for operational use. (Author)

AD-430 945 Div. 1
OTS price $10.10

Lear Siegler Inc., Santa Monica, Calif.
ADVANCED AUTOMATIC FLIGHT CONTROL SYSTEM FOR ATTACK/FIGHTER AIRCRAFT.
Final engineering rept.
15 Feb 64, 125p. Rept. no. ADR565
Contract NOw62 0813c
Unclassified report

Descriptors: (*Jet fighters, Flight control systems), (*Flight control systems, Automatic), Adaptive control systems, Flight testing, Configuration, Operation, Stabilization systems, Attitude control systems, Corrections, Research program administration, Compatability, Modules (Electronics), Attack bombers.

This final engineering report discusses results of the flight test of a reliable, high-performance, advanced, automatic flight control system (AFCS) for high-performance fighter/attack air-

planes. The flight test was conducted under a program to achieve a degree of standardization in such systems. The system employs a submodular electronic design concept, known commercially under the trade name of Millimin. Millimin submodules are used as units in a building-block technique which provides a system that is universally adaptable and which has maximum growth capabilities. The AFCS is capable of accepting additional command inputs from automatic carrier landing systems, from air data and bombing/navigation systems, and from ground control systems, thus providing additional automatic functions. (Author)

AD-431 116 Div. 1
OTS price $8.10

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
HUMAN TRACKING ABILITY FOR MAXIMUM TERRAIN FOLLOWING (PROJECT DIRECT).
Final rept.,
by W. J. Ruby and R. A. Monty. 31 Aug 63, 81p.
Rept. no. 1H1715E5
Contract N600 10 58660
Unclassified report

Descriptors: (*Pilots, Performance (Human)), (*Tracking, Performance (Human)), Control simulators, Flight simulators, Flight control systems, Terrain avoidance, Penetration, Command & control systems, Ground speed, Terrain, Errors, Display systems, Flight instruments, Human engineering, Training devices.

The present experiment examined two command signals: the aircraft flight vector angle, and the elevator deflection angle. Each of these two command signals were computed for three aircraft speeds, 0.6M, 0.75M, and 0.9M over two terrains, Southern Pennsylvania and Rocky Mountain. A group of twelve subjects was randomly assigned to each command signal for the experiment. Each subject flew each combination of aircraft speed and terrain (6 combinations) on each of three successive days. Three measures of performance were used, namely, integrated tracking error, normalized average clearance and normalized average offset. Conclusions and recommendations are presented. (Author)

AD-431 120 Div. 1
OTS price $7.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
EFFECTS OF OZONE, NITROGEN OXIDES, AND SOLAR ULTRAVIOLET RADIATION ON THE SUPERSONIC TRANSPORT,
by I. Jurkevich. Feb 64, 78p. Rept. no. R64SD2
Contract FA WA 4181, Proj. 206 3R
Unclassified report

Presented at the Fifth National Conference on Applied Meteorology of the American Meteorological Society, March 2-6, 1964, at Atlantic City, New Jersey.

Descriptors: (*Supersonic flight, Ozone), (*Aviation safety, Supersonic planes), (*Jet transport planes, Ozone), Nitrogen compounds, Oxides, Ultraviolet radiation, Solar radiation, High altitude, Hazards, Aircraft cabins, Gases, Toxicity, Materials.

A survey on the effects of ozone, oxides of nitrogen, and solar ultraviolet radiation was conducted in order o assess their significance in the design and safe operation of a supersonic transport. Effects on the passengers and crew as well as the structural design are considered in the light of existing knowledge. This report is subdivided into sections concerned with the natural occurrence and distribution of the gases in question, their toxicology, interaction with structural materials, and problems associated with their removal from the cabin environment. A summary is given of the effects of solar ultraviolet radiation on high altitude flying because of the intimate interaction of ozone with solar ultraviolet radiation. (Author)

AD-431 156 Div. 1
OTS price $7.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
SPACE RADIATION AND THE SUPERSONIC TRANSPORT,
by S. P. Shen. Jan 64, 72p. Rept. no. R64SD1
Unclassified report

Descriptors: (*Aviation safety, Cosmic rays), (*Cosmic rays, Aviation safety), (*Jet transport planes, Cosmic rays), Dose rate, Abundance, Shielding, High altitude, Hazards, Neutrons, Radiation hazards, Space environmental conditions, Cosmic ray bursts, Supersonic flight, Supersonic planes.

The significance of cosmic rays for the passengers and crew of a supersonic transport is examined in the light of existing knowledge. Both the ever-present cosmic rays from outside the solar system (galactic cosmic rays) and the occasional cosmic-ray bursts from the sun (solar cosmic rays) are considered. The absorbed dose due to galactic cosmic rays is estimated for every point in the atmosphere, i.e., for various latitudes and altitudes and for both solar maximum and solar minimum; this dose rate does not exceed 1 millirad per hour, here taken to be equivalent to 1 millirem per hour. The RBE dose due to neutrons produced in the atmospheric nuclear cascade is estimated separately for several points in the atmosphere; this dose rate similarly does not exceed 1 millirem per hour. The number of nuclear interactions ('stars') in tissue is also given for several points in the atmosphere. The poorly-known biological dose of these 'stars' and of stopped cosmic-ray 'heavy' nuclei is discussed briefly. The solar cosmic rays are then considered; this includes a discussion of their frequency of occurrence and their dose. The very rare solar-cosmic-ray events of the most intense and penetrating type can be a significant source of dose under certain unfavorable circumstances. The important question of short-range forecasting of such events so that they may be avoided where necessary by the supersonic transport is discussed. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-429 397 Div. 2
OTS price $1.10

Chicago U., Ill.
THEORETICAL INVESTIGATIONS OF THE EXPANSION OF THE H II REGIONS.
Final rept. 1 Jan-30 Sep 63,
by Peter O. Vandervoort. 13 Jan 64, 3p.
Grant Nonr G0008 63, Proj. NR046 794
Unclassified report

Descriptors: (*Gas ionization, Stars), (*Interstellar matter, Gas ionization), Nebulae, Models (Simulation), Absorption.

AD-429 450 Div. 2, 25
OTS price $12.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THEORY OF THE PHENOMENA OF ATMOSPHERIC ELECTRICITY. (TEORIYA YAVLENIY ATMOSFERNOGO ELEKTRICHESTVA),
by Ya. I. Frenkel'. 12 Nov 63, 167p.
FTD TT63 595 Unclassified report

Trans. from Gosudarstvennoye Izdatel'stvo Tekhniko-Teoreticheskoy Literatury, pp. 1-155, Leningrad 1949 Moskva.

Descriptors: (*Atmospheric electricity, Theory), Clouds, Polarization, Electric fields, Gravity, Electrical conductance, Air, Distribution, Thunderstorms, Electric discharges, Earth, Surfaces, Colloids, Adsorption.

AD-429 455 Div. 2
OTS price $28.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FORTY YEARS OF ASTRONOMY IN THE USSR, 1917-1957. PART I. (Astronomiya v SSSR Za Sorok Let 1917-1957,),
by A. A. Mikaylov, M. S. Zverev, P. G. Kulikovskiy, A. G. Masevich and Ye. R. Mustel.
20 Jan 64, 601p.
FTD TT63 1149 Unclassified report

Trans. from Fizmatgiz, Moskva, pp. 1-402, 1960.

Descriptors: (*Astronomy, Reviews), Moon, Planets, Comets, Meteorites, Sun, Stars, Stellar eclipses, Variable stars, Nebulae, Planetary atmospheres, Astrophysics, Galaxies.

AD-429 470 Div. 2, 23
OTS price $1.60

4th Weather Group, Andrews Air Force Base, Washington, D. C.
GUIDELINES FOR STAFF METEOROLOGISTS.
27 Jan 64, 12p.
4WG M80 1 Unclassified report

Supersedes 4WGM 80-1, 15 Jan 62.

Descriptors: (*Meteorology, Job analysis), Personnel management.

This report describes procedures and actions for STAFFMETs and relates these to specific authoritative documents needed by STAFFMETs in performance of their functions. (Author)

AD-429 496 Div. 2
OTS price $11.50

Wisconsin U., Madison.
STUDIES OF THE EFFECTS OF VARIATIONS IN BOUNDARY CONDITIONS ON THE ATMOSPHERIC BOUNDARY LAYER.
Annual rept., 63,
by Heinz H. Lettau, Raymond J. Deland, John P. Kearns, Ernest C. Kung and Larry S. Slotta.
Nov 63, 157p.
Contract DA36 039AMC00878, Task 1A0 11001B021 08
Unclassified report

Descriptors: (*Climatology, Boundary layer), (*Temperature, Measurement), (*Turbulent boundary layer, Analysis), Wind, Stresses, Fluid flow, Calibration, Detectors, Meteorology, Atmosphere.

Data from two classical flat plate boundary layer experiments were used to determine values of Karman's constant through the approach of a limiting wall condition for an explicit function described by flow structure. The constant was found to vary with Reynolds numbers. A theoretical model of the atmospheric boundary layer was used to make a survey of the aerodynamic roughness of natural surfaces of the northern hemisphere and to compute the distribution and seasonal variations of geostrophic drag coefficients and energy dissipation. Temperature spectra were measured over an experimental field of bushel baskets set on the ice surface of Lake Mendota, and also over the natural ice surface. Comparison of the spectra showed the effects of turbulence generated by the field as a whole and by the spacing of the baskets. The experimental field of bushel baskets and a small artificial forest were used in studies of wind profile modification. Determinations were made of the effect of obstacle albedo and solar heating on momentum transfer and of the momentum budget over the artificial forest. Characteristic equations of katabatic flow for height-dependent eddy diffusivity were derived. (Author)

AD-429 520 Div. 2
OTS price $28.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FORTY YEARS OF ASTRONOMY IN THE USSR, 1917-1957 (PART II),
by A. A. Mikaylov, M. S. Zverev, P. G. Kulikovskiy, A. G. Masevich and Ye. R. Mustel'.
20 Jan 64, 673p.
FTD TT63 1149 Unclassified report

Descriptors: (*Astronomy, Bibliographies), (*Bibliographies, Astronomy), Astronomical observatories, Astronomical cameras, Nebulae, Telescopes, Spectroscopy, Stars, Meteorites, Solar disturbances, Solar corona, Solar spectrum.

AD-429 528 Div. 2, 24
OTS price $5.60

Marine Lab., U. of Miami, Coral Gables, Fla.
MESO-SCALE SYNOPTIC ANALYSIS OF RADAR AND SATELLITE METEOROLOGICAL DATA.
Final rept.,
by H. W. Hiser, H. V. Senn and P. J. Davies.
Oct 63, 45p. Rept. no. 8988 2, ML64003
Contract Cwb10242
Unclassified report

Descriptors: (*Clouds, Photographic analysis), (*Photographic analysis, Cloud cover), Meteorological satellites, Cloud cover, Weather forecasting, Earth models, Mapping, Meteorological radar, Radar echo areas, Reflection, Curved profiles, Spheres.

Three case studies were made from Tiros I and III photographs, radar data, and synoptic weather observations in order to develop and explore techniques for future evaluations of satellite cloud photographs. The Fujita rectification technique for Tiros photographs was used but it is very time consuming and does not remove the camera nadir angle and earth curvature distortions. The development and testing of a system is described whereby Tiros photographs are projected onto a section of a sphere representing the earth's surface and rephotographed in order to rectify them geographically and remove earth curvature and camera nadir angle distortions. Although the process presently relies on knowledge of the positions of two points (or one point, north orientation, and a scale factor) and does not correct for satellite lens distortions beyond the establishing of the points used, it is entirely objective and should lend itself to an automated technique whereby small sections could be rectified well within tolerances needed for either operational or most research purposes. (Author)

AD-429 546 Div. 2
OTS price $1.60

New York State U., Albany.
(No title).
Final rept.,
by Vincent J. Schaefer. 15 Sep 63, 16p.
AROD 4569 1 Unclassified report

Descriptors: (*Weather stations, Research program administration), Infrared research, Meteorological instruments, Diurnal variations, Lightning, Raindrops, Wind, Condensation.

AD-429 775 Div. 2, 12
OTS price $1.60

Aerospace Information Div., Washington, D. C.
TRANSMITTING SATELLITE PROPAGATION STUDIES, COMPILATION OF ABSTRACTS.
5 Feb 64, 8p.
AID P64 9 Unclassified report

Trans. from Russian text.

Descriptors: (*Satellites (Artificial), Data transmission systems), (*Data transmission systems, Abstracts), Upper atmosphere, Charged particles, Photomultipliers, Geiger counters, Cosmic rays, Electron density, Instrumentation.

AD-429 870 Div. 2
OTS price $16.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COSMIC RESEARCH (Kosmicheskiye Issledovaniya).
1963, 141p.
FTD TT64 42 Unclassified report

Trans. from Izdatel'stvo Akademii Nauk SSSR, 1:2, pp. 195-334, 1963.

Descriptors: (*Astronomy, Scientific research), (*Astrophysics, Scientific research), Celestial mechanics, Solar corona, X-ray spectrum, Brightness, Scattering, Light, Geophysics, Proton, Ions, Distribution, Troposphere.

AD-429 975 Div. 2
OTS price $15.50

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
MICROMETEOROLOGICAL OBSERVATIONS AT EGLIN AFB LAND TEST AREA C-52 (SOUTH),
by Ralph R. Ruyle, Jr. and William P. Cramer.
Jan 64, 229p.
APGC Proj. 0138W
APGC TDR64 6 Unclassified report

Descriptors: (*Micrometeorology, Data), Wind, Atmospheric temperature.

Detailed wind and temperature data were gathered in an atmospheric cylinder 2000 feet in diameter and 200 feet in height. About 25 percent of the 216 sets of observations were considered anomalous because of unusual flow patterns or unusual shears. Vertical shears as great as 13 knots at 200 feed were observed. These data illustrate space and time variations which can be expected in the winds and temperatures near Land Test Area C-52 (South) during early mornings in the summer and illustrate the need for additional data gathering and analysis. (Author)

AD-430 002 Div. 2
OTS price $8.60

Royal Inst. of Tech. (Sweden).
GRAVIMETRIC GEODESY FREE OF DENSITY ESTIMATES THROUGH ANALYSIS OF DISCRETE GRAVITY DATA,
by Arne Bjerhammar. 1963, 94p.
Contract DA91 591EUC2943
Unclassified report

Descriptors: (*Geodesics, Boundary value problems), Harmonic analysis, Gravity, Integral equations, Density, Earth models, Reduction, Series.

AD-430 015 Div. 2
OTS price $2.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
GROUND TEMPERATURE OBSERVATIONS GALENA, ALASKA,
by G. W. Aitken. May 63, 26p.
CRREL TR102 Unclassified report

Descriptors: (*Sails, Surface temperature), Polar regions, Climatology, Soil mechanics, Data, Periodic variations, Atmospheric temperature, Atmospheric precipitation.

Summaries are presented of (1) ground temperature data at 9 depths from 0.0-22.0 ft collected daily at Galena (Alaska) during 1947-1958, (2) comparative climatological data collected by the U. S. Weather Bureau for the years 1944-1957, and (3) soil data from samples obtained in July 1946 and April 1958. Tables are given of (1) the mean or average climatological data, (2) the maximum, minimum, and average ground temperatures for the 11 years as determined from data recorded on the first day of each month, and (3) the ground temperatures recorded the first day of each month during the 1947-58 period. Ground-temperature gradients for a typical thaw and freeze season (1950-51) are graphed and the maximum and minimum temperatures recorded at each depth are also presented. Seasonal freezing varied from year to year; the averageseasonal depth of freeze was approximately 5.5 ft below the ground surface. The data show there is no permafrost at the temperature-well location to a depth of 22.5 ft, but it is probable that permafrost does exist at other locations on the Galena flood plain. (Author)

AD-430 017 Div. 2
OTS price $15.50

Lockheed Aircraft Corp., Burbank, Calif.
ASTRODYNAMIC CONSTANTS ANALYSIS.
Final rept.

31 July 63, 238p. Rept. no. LR17571
Contract AF19 628 1619, Proj. 7600, Task 760006
AFCRL 63 705 Unclassified report

Descriptors: (*Astrophysics, Astronomical data), (*Celestial mechanics, Corrections), (*Moon, Motion), Astronomical geodesics, Gravity, Planets, Radar reflections, Standardization, Ranges (Distance), Motion, Theory, Astronomy.

A summary is presented of current values of astrodynamic constants, including heliocentric, geocentric, selenocentric and planetocentric constants. Interrelationships between constants are given. An internally consistent but tentative set of recommended values is given. A discussion is made of the relative accuracies of determinations of the geocentric gravitational constant from radar and angular observations of the Moon and from other sources. (Author)

AD-430 050 Div. 2, 25
OTS price $4.60

New Mexico State U., University Park.
AN OBSERVATIONAL STUDY OF ASTRONOMICAL SEEING AND AN INVESTIGATION OF INSTRUMENTATION DESIGNED TO REDUCE THE EFFECTS OF ATMOSPHERE-INDUCED IMAGE ABERRATIONS.
Final rept.
by Bradford A. Smith. Oct 63, 35p.
Contract AF19 604 5535, Proj. 7698, Task 86053
AFCRL 63 217 Unclassified report

Descriptors: (*Optical images, Atmospheric refraction), Vision, Visual acuity, Diurnal variations, Wind, Instrumentation, Distortion, Photomultipliers, Servomechanisms.

A study of telescopic image abberations at Las Cruces, New Mexico leads to generalizations on the local seeing behavior. Diurnal effects as well as the effects of local winds are included along with the techniques used to study these aberrations. An investigation into the possibilities of image aberration compensation is described. (Author)

AD-430 056 Div. 2
OTS price $1.10

Academy of Natural Sciences of Philadelphia, Pa.
STUDIES ON QUATERNARY SHORELINES.
Final rept., 1 Jan-31 Dec 63,
by Horace G. Richards. 15 Jan 64, 9p.
Grant Nonr G00019 63
Unclassified report

Descriptors: (*Marine geology, Atlantic ocean), Research program administration.

This study is a brief report of the work on Quaternary shorelines accomplished during 1963. The project is grouped into the following areas: Argentina, Continental Shelf off New Jersey, Virginia, North Carolina, Massachusetts, Maine and Quebec, Northwest Territories, Canary Islands, Europe. (Author)

AD-430 060 Div. 2
OTS price $7.60

North American Aviation, Inc., Downey, Calif.
NARROW-BAND PHOTOMETRY OF STARS PLANETS AND SATELLITES,
by D. H. McNamara. 23 Jan 64, 76p. Rept. no. SID64 78
Contract Nonr3979 00, Proj. NR046 801
Unclassified report

Descriptors: (*Stars, Luminescence), (*Planets, Spectrophotometers), Ultraviolet spectroscopy, Asteroids, Narrowband, Spectra (Visible & ultraviolet), Spectrum analyzers, Colors, Binary stars, Temperature, Photometers, Band spctrum.

Contents: Narrow Band Photometry of NGC 752; The Luminosities of Horizontal Branch Stars in Four Globular Star Clusters; Narrow Band Photometric Classification of Eclipsing Binaries; Photometry of Planets, Satellites, and Asteroids.

AD-430 062 Div. 2
OTS price $1.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
ELEVATIONS ON THE ICE SHEET OF SOUTHERN GREENLAND,
by Steven J. Mock and Richard H. Ragle. Mar 63, 18p.
Proj. 8 66 02 400
CRREL TR124 Unclassified report

Descriptors: (*Height finding, Ice islands), (*Ice islands, Height finding), Mapping, Altimeters, Snow, Stratigraphy, Density, Temperature, Barometers, Measurement, Air, Theory, Tables, Atmosphere, Gravity.

Elevations were determined for over 200 points on the ice sheet of southern Greenland using leapfrog altimeter techniques. These methods were found to give reliable elevations over extended distances. Elevations were consistently lower, by several hundred feet, than those indicated on currently available charts. (Author)

AD-430 065 Div. 2
OTS price $3.60

New York U., N. Y.
THE INTERPRETATION OF WAVE SPECTRA IN TERMS OF THE WIND PROFILE INSTEAD OF THE WIND MEASURED AT A CONSTANT HEIGHT,
by Willard J. Pierson, Jr. Dec 63, 35p.
Rept. no. GSL63 15
Contract N62306 1042
Unclassified report

Descriptors: (*Wind, Curved profiles), (*Water waves, Wind), Ocean waves, Theory, Turbulence, Measurement, Frequency, Friction, Velocity, Calibration, Instrumentation, Recording systems, Stresses, Reynolds number.

The effect of the variation of the mean wind with height (as a function of the variously proposed drag coefficients) on the interpretation of wave spectra for fully developed seas is analyzed. It is found that this effect brings the results of Neumann, Wilson, and Moskowitz and Pierson into closer agreement. Further improvement in wave theory will depend on the solution of problems in turbulence and on more precise measurements of waves and winds at sea. (Author)

AD-430 066 Div. 2, 25, 31, 6
OTS price $4.60

Woods Hole Oceanographic Institution, Mass.
OCEANOGRAPHIC AND UNDERWATER ACOUSTICS RESEARCH.
Rept. for 1 May-31 Oct 63.
Nov 63, 44p. Ref. no. 63 42
Contracts Nonr3243 00, Projs. NR261 102, NR261 136
Unclassified report

Descriptors: (*Underwater object locators, Submarines), (*Oceanology, Bibliographies), Sound ranging, Ocean bottom topography, Underwater sound, Underwater cameras, Underwater photography, Underwater sound equipment, Bathythermographs, Seismic waves, Heat transfer, Underwater equipment, Acoustic detectors.

Searching for the sunken submarine THRESHER by various means is discussed. Activities were devoted to the development of systems or components of systems for search and for navigational control required in such operations. One system of submerged navigation was employed for locating suspended instruments by acoustic ranging from the ship. A second navigation system was also tested which depends on acoustic ranging either from the ship or from the suspended instrument to a hydrophone buoyed near the bottom. This hydrophone is connected to a radio link in a surface buoy. This system will be useful not only for navigation but also for bottom reflection studies. A program has been started to print and mount all photos taken by WHOI on the THRESHER search; it will be coordinated with other similar efforts in the continuing investigation of the disaster. (Author)

AD-430 099 Div. 2, 6
OT price $9.10

Stanford Electronics Labs., Stanford U., Calif.
RADAR DETECTION OF IONIZED NITRIC OXIDE IN THE LOWER IONOSPHERE.
Final rept.,
by Lawrence Colin. Oct 63, 106p. Rept. no. SEL63 089
Contract AF19 628 233, Proj. 8653
AFCRL 63 795 Unclassified report

Descriptors: (*Nitrogen compounds, Oxides), (*Detection, Radar), (*Ionosphere,), Radar reflections, Spectrum analyzers, Gas ionization, Frequency, Rockets, Mass spectroscopy, Measurements, Theory, Density, Electrons, Analysis.

High-resolution spectral analyses of radar echoes from field-aligned ionization in the lower ionosphere (E region) have uncovered a discrete component which apparently corresponds to the gyro frequency of singly ionized nitric oxide. No other discrete component is obvious from the data studied thus far, which were collected at Stanford during nighttime hours. Thus, this new radar sampling technique suggests that nitric oxide is the principal ionic species in the nighttime E region, in agreement with a limited number of rocket-borne mass-spectrometer measurements. The analysis technique developed and used, based on electronic filtering and integration, is shown to be optimum for power spectral density estimation. The presence of a spectral peak corresponding to the NO^+ gyro frequency is unambiguously established through this process. (Author)

AD-430 215 Div. 2
OTS price $3.60

Northwestern Univ., Evanston, Ill.
A GEOLOGICAL PROCESS-RESPONSE MODEL FOR ANALYSIS OF BEACH PHENOMENA,
by W. C. Krumbein and Jay V. Hall, Jr. Jan 64, 40p. Technical rept. 8
Contract Nonr122826, Task NR389 135
Unclassified report

Descriptors: (*Beaches, Models (Simulation)), Hydrology, Sand, Breakwaters, Erosion, Aerial photographs.

Beach processes and deposits are described in terms of a conceptual process-response model that considers the processes and deposits as separate though closely related aspects of shoreline phenomena. The model provides a formal framework for analysis of natural beaches as they may be modified or controlled by the beach engineer. (Author)

AD-430 240 Div. 2
OTS price $1.60

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF WATER PERMEABILITY OF FROZEN GROUND,
by V. D. Komarov. 8 Jan 64, 18p.
FTD TT63 928 Unclassified report

Trans. from Meteorologiya i Gidrologiya, No. 2, pp. 10-18, 1957.

Descriptors: (*Permafrost, Permeability), Water, Soil mechanics, Soils, Penetration, Absorption (Physical), Ice.

AD-430 307 Div. 2
OTS price $11.00

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
SUMMARY PROCEEDINGS OF THE CONFERENCE ON TROPICAL METEOROLOGY.
1963, 146p. Unclassified report

Descriptors: (*Meteorology, Symposia), (*Symposia, Meteorology), (*Tropical regions, Meteorology), Weather forecasting, Jet streams (Meteorology), Dynamics, Hurricane tracking, Analysis, Rainfall, Water, Motion, Convection, Heat transfer, Upper atmosphere, Wind.

This conference on tropical meteorological research was the second in what is planned as an annual review and coordination, under sponsorship of the United States Army Electronics Research and Development Laboratories. The first conference, in 1962, was essentially for the purpose of planning a broad program in tropical meteorology and reviewing the then state-of-the art. In order to keep the 1963 conference relatively informal and permit maximum flexibility, the speakers were not requested to prepare or submit written copies of their presentations, although several did so. The majority of the presentations and the ensuing discussions which appear in this report were transcribed from tape recordings made during the conference. They are essentially verbatim, although certain liberties have been taken by the editors in an attempt to improve sentence structures that seem acceptable to the ear, but become involved and unwieldly in print. Also, a number of references to slides, blackboard notations, etc., which are not available for publication, have been eliminated or reworded. (Author)

AD-430 350 Div. 2
OTS price $10.10

Redstone Scientific Information Center, Redstone Arsenal, Ala.
TEKTITES. A BIBLIOGRAPHY,
by Carlotte F. Shenk. 15 Jan 64, 121p.
RSIC 107 Unclassified report

Descriptors: (*Meterological phenomena, Bibliographies), Meteorites.

This bibliography consists of 771 references on tektites and some closely related subjects. Many entries are annotated, giving information

about tektite origins, composition, discovery sites, ages, formation, and history. The material gathered is international in scope, covering the literature from te early 19th century through 1963. Titles and other bibliographical data generally appear in the languages of origin. The bibliography includes a separate author index. The entire work is designed for general service and as a check list n this and closely associated subjects. (Author)

AD-430 424 Div. 2, 9
OTS price $2.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
THE EFFECTS OF MOUNTAINS ON AIR CURRENTS,
by Adriano Gazzola. 7 Feb 64, 26p.
RSIC 131 Unclassified report

Trans. from Rivista di Meteorologia Aeronautica, No. 1, 1963.

Descriptors: (*Atmospheric motion, Mountains), (*Atmospheric motion, Theory), Wind, Theory, Meteorology, Cumulus clouds, Cirrus clouds, Laminar flow, Turbulence, Stratus clouds, Hydrodynamics, Motion, Mathematical models, Numerical analysis, Oscillation, Stratosphere, Troposphere.

A brief discussion is presented about the state of art of research on orographic waves. Analogy is made to water waves. Orographic clouds are described, and the 'rotor' phenomena is explained. Notes are made on the theory of wave motion under ideal conditions and in the different atmospheric layers. (Author)

AD-430 444 Div. 2, 30
OTS price $1.10

Travelers Weather Research Center, Hartford, Conn.
WEATHER DATA PROCESSING RESEARCH AND DEVELOPMENT PROGRAM.
Monthly progress rept.
Jan 64, 8p.
Contract Cwb10704 Unclassified report

Descriptors: (*Weather forecasting, Research program administration), (*Programming (Computers), Weather forecastion), Data processing systems, Mathematical prediction.

A brief description is given of the program. The prediction equation is given and explained. (Author)

AD-430 473 Div. 2, 18
OTS price $1.60

Aerospace Information Div., Washington, D. C.
TRANSMITTING SATELLITE PROPAGATION STUDIES. COMPILATION OF ABSTRACTS.
23 Jan 64, 20p.
AID P64 5 Unclassified report

Descriptors: (*Satellites (Artificial), Propagation), (*Transmissions, Satellites (Artificial)), (*Abstracts, Propagation), Launching, Earth, Equatorial orbit trajectories, Radio waves, Atmosphere, Charged particles, Ionosphere, Absorption, Reflection, Radio navigation.

AD-430 498 Div. 2, 30
OTS price $2.60

Queen's U., Belfast (Gt. Brit.).
THE MEASUREMENT OF HIGH ALTITUDE WIND VELOCITIES FROM VAPOUR RELEASES. II,
by F. J. Smith. 1963, 22p.
AFCRL 64 225 Unclassified report

Descriptors: (*Clouds, Programming (Computers)), Condensation trails, High altitude, Vapors, Vector analysis, Spheres, Astronomy, Least squares method, Cloud height indicators.

A digital computer method is described for determining accurately and quickly the position in space of either a luminous vapour trail or a small luminous vapour cloud. The position is found by analysing data from photographs of the object and of the star field from at least two camera positions. A correction is included to take account of the curvature of the Earth's surface. (Author)

AD-430 508 Div. 2
OTS price $1.60

4th Weather Wing, Colorado Springs, Colo.
AN OBJECTIVE AID FOR FORECASTING CEILINGS AND VISIBILITIES LESS THAN 500/1,
by Thomas H. Simmonds. Jan 64, 11p.
4WW TP64 5 Unclassified report

Descriptors: (*Ceiling, Visibility), Data.

The investigation was conducted to develop objective aids for forecasting critical values of ceilings and visibilities. The data sample used included all months for the years 1956 through 1960. The criteria to be met and the attached diagrams are self-explanatory and their use is discussed. A table is included which indicates the performance of this technique on the dependent data. (Author)

AD-430 520 Div. 2, 8
OTS price $4.60

Aracon Geophysics Co., Div. of Allied Research Associates, Inc., Concord, Mass.
WEATHER RADAR RESEARCH AND STORM DYNAMICS.
Final rept.,
by Raymond Wexler. 31 Dec 63, 45p. Rept. no. F9186 3
Contract AF19 628 292, Proj 6672, Task 667203
AFCRL 64 202 Unclassified report

Descriptors: (*Meteorological radar, Storms), (*Weather forecasting, Meteorological radar), (*Storms, Bibliographies), Tornadoes, Cyclones, Meteorology, Atmospheric precipitation, Rainfall, Wind, Tropical cyclones, Hail.

The following topics are discussed: Radar analysis of Hurricane Esther 1961, Crossing angles in hurricane bands, and Origin of a tornado's rotation. A complete list of other reports with abstracts, published in connection with this research, is included.

AD-430 526 Div. 2
OTS price $2.60

Aerospace Information Div., Washington, D. C.
PROBLEMS AND METHODS OF THE ABSOLUTE PHOTOMETRY OF NOCTILUCENT CLOUDS.
28 Jan 64, 28p.
AID T64 7 Unclassified report

Descriptors: (*Clouds, Photographic analysis), Photometers, Aerosols, Scattering, Spectrum analyzers, Polarization, Luminescence, Optical properties, Brightness, Cameras.

The object of investigating noctilucent clouds by photometric methods is to obtain optical characteristics of the cloud-forming aerosol which will permit the formulation of conclusions concerning the chemical composition and physical state of the dispersed particles. Among these characteristics are: (1) the scattering indicatrix, which ex-

presses the directional distribution of the scattered light; (2) variation of the scattering coefficient with wavelength; (3) variation of extinction along the spectrum; (4) polarization of the scattered light; and (5) the character of such luminescence as may exist in the medium. (Author)

AD-430 543 Div. 2
OTS price $1.10

Woods Hole Oceanographic Institution, Mass.
BIBLIOGRAPHY OF REPORTS 1963.
Jan 64, 11p. Ref. no. 63 47
Unclassified report

Descriptors: (*Oceanology, Bibliographies), Ocean currents, Fishes, Marine biology, Marine geophysics, Underwater sound.

AD-430 582 Div. 2
OTS price $1.10

Emmanuel Coll. Research Language Center, Boston, Mass.
THE MERIDIONAL, AEROLOGICAL CROSS SECTION BETWEEN THE TROPICS OF THE NORTHERN AND SOUTHERN HEMISPHERE (Meridional'nyi aerologicheskii razrez mezhdu tropikami iuzhnogo u severnolo polusharii), by L. A. Zhdanov, tr. by Richard M. Holden.
Oct 63, 9p. Rept. no. E T R63 12
Contract AF19 604 8505
Unclassified report

Trans. from Bulleten 'Sovetskoi Antarkticheskoi Ekspeditsii, No. 22, pp. 32-35, 1960.

Descriptors: (*Tropical regions, Air mass analysis), Temperature, Tropopause, Tropical cyclones.

AD-430 611 Div. 2, 25
OTS price $2.60

American Meteorological Society, Boston, Mass.
INVESTIGATION OF THE PHYSICAL CONDITIONS IN SOLAR PROTUBERANCES BY THE EMISSION LINES WITH SELF-ABSORPTION (Issledovanie fizicheskikh uslovii v solnechnykh protuberantsakh po emissionnym liniiam s samopogloshcheniem), by A. B. Severnyi, tr. by David Kraus. 1963, 23p.
Research trans. no. T R84
Contract AF19 604 6113
Unclassified report

Trans. from Izvestiia Krymskoi Astrofizicheskoi Observatorii, Vol. 12, pp. 33-45, 1954.

Descriptors: (*Sun, Line spectrum), Astrophysics, Solar atmospheres, Solar eclipses, Solar spectrum, Hydrogen, Solar radiation, Helium, Absorption, Absorption spectrum, Temperature.

An examination is made of the problem of determining the physical conditions in protuberances on the basis of study of extra-ecliptic spectrograms of emission lines burdened with self-absorption. Application of the proposed method to the typical bright protuberance of 19 July 1952 made it possible to find the number of Ca(+) ions in the ground state, the number of hydrogen atoms in the second quantum state, of orthohelium atoms in the 2s state, the electron density, and also to evaluate the state of ionization. The kinetic temperature of the protuberance, found from the contours of lines H sub a and H and K proved to be approaching 14,000 degrees. The possibility of the formation of a high electron temperature during the motions of protuberances is investigated. (Author)

AD-430 614 Div. 2, 6
OTS price $2.60

Illinois State Water Survey, Urbana.
INVESTIGATION OF THE QUANTITATIVE DETERMINATION OF POINT AND AREAL PRECIPITATION BY RADAR ECHO MEASUREMENTS.
Quarterly technical rept. no. 8, 1 July-30 Sep 63,
by A. L. Sims, E. A. Mueller, G. E. Stout and T. E. Larson. 30 Sep 63, 25p.
Contract DA36 039sc87280, DA Task 3A99 07 001 01
Unclassified report

Descriptors: (*Atmospheric precipitation, Meteorological radar), Weather forecasting, Raindrops, Drops, Radioactive fallout, Trafficability, Least squares method, Data processing systems, Programming (Computers), Storms, Curve fitting.

Two drop cameras were operated in Illinois and one at Flagstaff, Arizona. Data obtained from these installations are being reduced and analyzed. The rainfall rate-radar reflectivity relationships are summarized. The data from Miami, Florida, has been stratified by synoptic type, rainfall type, and by a measure of the instability. A brief description of an objective means of coalescence curve fitting is described. (Author)

AD-430 637 Div. 2, 15
OTS price $2.60

Oslo U. (Norway).
A NUMERICAL INTEGRATION EXPERIMENT USING THE PRIMITIVE EQUATIONS FOR A TWO LAYER MODEL OF THE ATMOSPHERE,
by A. Grammeltvedt. 29 Oct 63, 25p. Rept. no. TN3
Contract AF61 052 525
AFCRL 63 947 Unclassified report

Descriptors: (*Atmosphere, Numerical analysis), Mathematical prediction, Motion, Equations, Partial differential equations, Barometric pressure, Atmospheric motion, Maps, Difference equations, Periodic variations, Atmospheric temperature.

A method is described for numerical integration of the primitive equations for an atmospheric model consisting of two material layers confined in a beta - plane channel. Results are presented of a 24-hour integration based on geostrophic initial winds. (Author)

AD-430 638 Div. 2, 6
OTS price $1.60

Florence U. (Italy).
ON THE POSSIBILITY OF DISCERNING SPORADIC METEOR ECHOES AND SHOWER-METEOR ECHOES BY USING A WIDE-BEAM RADAR SET,
by N. Carrara, P. F. Checcacci, A. Consortini and L. Ronchi. Sep 62, 20p. Rept. no. TN2
Contract AF61 052 592
AFCRL 63 42 Unclassified report

Descriptors: (*Meteors, Radar signals), Ablation, Radar equipment, Antenna radiation patterns, Experimental data.

The possibility of discerning sporadic meteor echoes and shower meteor echoes by using a wide-beam radar set is discussed on the basis of the data collected during Perseids activity on 11, 12, 13 August 1960. (Author)

AD-430 639 Div. 2
OTS price $2.60

Liege U., (Belgium).
RECENT PROGRESS IN COMETARY SPECTROSCOPY,
by P. Swings. 20 Nov 63, 24p. Rept. no. TN5
Contract AF61 052 587
AFCRL 64 227 Unclassified report

Descriptors: (*Comets, Spectroscopy), Resolution, Excitation, Atomic properties, Ions, Theory, Spectrophotometers, Emissivity, Sodium, Measurement, Monochromatic light, Polarization, Solar flares.

Recent progress in cometary physics is disucssed. The new observational results are described. The report discusses the recent progress in understanding the excitation mechanism in the case of the di- and triatomic radicals and ions. (Author)

AD-430 698 Div. 2
OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
SEA ICE STUDIES ON MCMURDO SOUND DURING DEEP FREEZE-63,
by N. S. Stehle. Dec 63, 26p.
Task YF015 11 01 052
NCEL TN N565 Unclassified report

Descriptors: (*Ice, Oceans), (*Ice islands), Freezing, Salinity, Density, Thickness, Shear stresses, Drainage, Sampling, Feasibility studies, Temperature, Experimental data, Thermocouples.

Studies of one-year-old sea ice and very young sea ice were conducted during the austral summer of 1962-63 at McMurdo Station, Antarctica. During the observation period on the one-year-old sea ice approximately 18 inches of ice were lost solely on the bottom surface. Average salinities and densities of the total ice thickness decreased slightly with time. Average shear strength values for the total ice thickness changed very little with time; however, a decrease in shear strength was noted in the middle portion of the ice sheet. This corresponded closely with the level at which drainage of brine was noted. The very young sea ice was observed in a 6-1/2- by 7-foot well in the one-year-old ice. Ice growth and salinity of the newly accreted ice, older ice, and the well water were checked every 2 to 3 days. Although sampling was done primarily during January, the well study of very young ice appears to be very promising and further studies of this type are planned. (Author)

AD-430 705 Div. 2
OTS price $2.60

Manchester U. (Gt. Brit.).
RESEARCH INTO METHODS OF DETERMINING THE RELATIVE HEIGHTS OF PHYSIOGRAPHIC FEATURES OF THE MOON.
Annual summary rept. no. 2, 1962-1963,
by Zdenek Kopal. Aug 63, 21p.
Contract AF61 052 524
AFCRL 64 83 Unclassified report

Descriptors: (*Moon, Oscillation), (*Extraterrestrial topography, Moon), Photographic analysis, Solar eclipses.

The report concerns work on re-determination of the libration constants and development of a theory of librations of the Moon; evaluation and measurement of old Paris plates of the Moon; determination of the shape of the Moon from eclipse photographs and an analysis of previous observations of the form of the Moon by expansion in tesseral harmonics. (Author)

AD-430 706 Div. 2, 24, 30
OTS price $1.10

Queen's U., Belfast (Gt. Brit.).
A SEA-LEVEL PHOTOGRAPHIC OBSERVATION OF THE DAY AIRGLOW EMISSION OF ATOMIC OXYGEN AT 6300A,
by A. H. Jarrett and M. J. Hoey. 1963, 7p.
Grant AF EOAR63 85
AFCRL 64 220 Unclassified report

Descriptors: (*Aurorae, Photographic analysis), (*Sky brightness, Line spectrum), Interferometers, Spectrum analyzers, Diurnal variations, High altitude, Meteorological balloons, Meteorological satellites, Solar satellites, Space stations, Oxygen, Photographic equipment.

AD-430 707 Div. 2
OTS price $2.60

Liege U. (Belgium).
NOTE ON SOME CONSEQUENCES OF ALFVEN'S CONDITIONS FOR INTERPRETING THE VAN ALLEN ZONES AND THEIR MOVEMENTS AS WELL AS DISTANT AZIMUTHAL CURRENTS,
by J. Lemaire. 25 Oct 63, 23p. Rept. no. TN4
Contract AF61 052 587
AFCRL 64 226 Unclassified report

Descriptors: (*Van Allen radiation belt), (*Charged particles, Motion), Electric currents, Theory, Magnetic fields, Experimental data, Astrophysics, Energy, Terrestrial magnetism, Drift, Velocity, Dipole moments.

Some consequences of ALFVEN's conditions for interpreting the Van Allen Zones and their movements as well as distant azimuthal currents are discussed. (Author)

AD-430 719 Div. 2, 8
OTS Price $5.60

Raytheon Co., Norwood, Mass.
INVESTIGATION OF ELECTRICAL CHARACTERISTICS OF ROCK MEDIUM ON CAPE COD,
by Carson K. H. Tsao. Dec 63, 51p. Rept. no. SR1
Contract AF19 628 2362, Proj. 4600, Task 460008
AFCRL 64 1 Unclassified report

Descriptors: (*Rock (Geology), Electrical properties), Radio signals, Propagation, Dipole antennas, Electrical conductance, Attenuation, Very low frequency, Measurements, Water, Sampling, Radio waves, Radio fields, Intensity, Gain, Experimental data.

Experiments were conducted on Cape Cod, Massachusetts, to investigate the electrical characteristics of the subsurface rock strata and various techniques related to the rock-propagated radio signals. Electrically short dipoles were placed in drill holes to determine the conductivitites of the rock media surrounding the drill holes and the attenuation by the overburden of distant VLF signals traveling through it from the surface of the ground to the rock. Propagation tests were made between antennas placed in two drill holes separated by a distance of 1 mile. By assuming the rock to be a semi-infinite medium and the overburden to be a perfect ground plane, the attenuation and phase constants of the rock medium were deduced independently and used to obtain the bulk conductivity along the path. (Author)

AD-430 887 Div. 2
OTS price $1.60

Block Engineering, Inc., Cambridge, Mass.
INFRARED HORIZON STUDIES.
Final rept.,
by Merle J. Persky. 31 Dec 63, 16p.
Contract AF19 628 2946, Proj. 4427, Task 442702
AFCRL 64 210 Unclassified report

Descriptors: (*Atmospheric sounding, Balloons), Flight testing, Balloon equipment, Infrared phenomena, Infrared research, Telemeter systems, Infrared spectrophotometers, Telescopes, Monitors, Time interval counters, Magnetometers, Power supplies, Performance (Engineering), Telemetering data, Recovery.

A high altitude balloon flight to gather data of the earth's infrared horizon is described. The balloon failed to reach the float altitude of 100,000 feet and therefore, the desired spectral information could not be obtained. (Author)

AD-430 888 Div. 2, 25
OTS price $7.60

Electrical Engineering Research Lab., U. of Texas, Austin.
CALCULATED REFRACTIVE INDICES FOR SMALL-AMPLITUDE GEOMAGNETIC DISTURBANCES.
by Carroll W. Chapman, Bob M. Fannin and Billy G. Gray. 15 Dec 63, 71p. Rept. no. SR6 58
Contract AF19 604 8038, Proj. 4603
AFCRL 64 228 Unclassified report

Descriptors: (*Refractive index, Upper atmosphere), Atmospheric refraction, Plasma physics, Magnetic fields, Plasma medium, Electron density, Ionospheric disturbances, Terrestial magnetism, Theory.

The results of numerical computations of the refractive indices for the three modes of hydro magnetic wave propagation existing in the earth's upper ionosphere and outer atmosphere in the frequency range 10 to the minus 3 power to 10 cycles per second are presented. These results are derived from a small amplitude, collisionless, fully ionized plasma model in which the effects of scalar, adiabatic pressure variations, finite conductivity, and displacement currents in the plasma constituents are taken into account. The refractive indices are presented graphically as functions of the angle of phase propagation mea sured with respect to the direction of a steady magnetic field so as to clearly show their general characteristics as a function of angle and the degree of anisotropy of the various modes of propagation. The dispersion relation which results from the general set of equations used here is a fourth degree polynomial whose roots determine the refractive indices of the four modes of propagation in the medium. These are classified as ordinary, extraordinary, and plasma acoustic; the fourth mode, associated with electron oscilla tions, gives waves which are evanescent for the range of plasma parameters of interest and is therefore not plotted graphically. (Author)

AD-430 914 Div. 2
OTS price $6.60

Ghana U. (Africa).
EQUATORIAL STUDY OF IRREGULARITIES IN THE IONOSPHERE.
Final rept., Oct 60-Aug 63,
by B. R. Clemesha, G. S. Kent, J. R. Koster and R. W. Wright. Aug 63, 67p.
Contract AF61 052 421
AFCRL 63 532 Unclassified report

Descriptors: (*Ionospheric disturbances, Electromagnetic wave reflections), Ionospheric propagation, Night sky.

This report covers 1960-63 results on oblique incidence, satellite scintillation, D region scatter, shape of irregularities in D & E regions, flutter fading, and direct back-scatter from the F region. (Author)

AD-430 918 Div. 2, 25
OTS price $7.60

Queen's U., Belfast (Gt. Brit.).
RESEARCH ON PHYSICS OF THE UPPER ATMOSPHERE.
Final technical rept.,
by D. R. Bates, A. Dalgarno, A. H. Jarrett, B. L. Moiseiwitsch and A. L. Stewart. 30 Jun 63, 77p.
Grant AF EOAR62 118
AFCRL 64 216 Unclassified report

Descriptors: (*Upper atmosphere, Theory), Diurnal variations, Atmospheric temperature, Digital computers, High altitude, Night sky, Sky brightness, Infrared radiation, Interferometers, Clouds, Infrared spectrophotometers, Partial differential equations, Ionization, Quantum mechanics, Hyperfine structure.

Contents: Investigations Directly Concerned With the Upper Atmosphere, Diurnal variation of the temperature of the thermosphere, A digital computer method of locating high altitude vapour releases;Determination of the temperature of the upper atmosphere from the profiles of nightglow emissions using a Fabry-Perot scanning interferometer; Variations of hydroxyl and oxygen emissions in the infra-red airglow; All-sky interferometer for airglow studies.

AD-430 940 Div. 2
OTS price $2.75

Defense Documentation Center, Alexandria, Va.
EXTRA-TERRESTRIAL WEATHER A DDC REPORT BIBLIOGRAPHY
Bibliography for 1953-Dec 63.
Feb 64, 1v. 721 refs.
Unclassified report

Descriptors: (*Planetary atmospheres, Space environmental conditions). (*Solar disturbances, Electromagnetic fields). (*Lunar environment, Space probes). (*Van Allen radiation belt, Interstellar matter). Solar wind, Meteorological satellites, Solar atmosphere, Solar satellites, Venus probes, Mars probes, Lunar probes, Lunar satellites, Lunar eclipses, Sun, Sunspots, Solar corona, Electromagnetic waves, Solar radiation, Symposia, Bibliographies.

The present bibliography was prepared by DDC in response to requests for information concerning extra-terrestrial weather. Citations are included for documents cataloged by DDC from 1953 through December 1963. Entries are arranged in numerical sequence by subject. Future reports accessioned by DDC will be announced in the Technical Abstract Bulletin by subject.

AD-430 957 Div. 2
OTS price $1.60

Instituto Geofisico De Huancayo, Lima, Peru.
MEASUREMENTS OF THE NIGHT SKY RADIATIONS AT THE MAGNETIC EQUATOR, HUANCAYO, PERU.
Final technical rept., for period 1958-1962,
by Mateo Casaverde and Alberto Giesecke.
Oct 63, 17p.
Contract AF19 604 7213, Proj. 8627, Task 86274
AFCRL 63 736 Unclassified report

Descriptors: (*Sky brightness, Infrared radiation), (*Infrared radiation, Sky brightness), Measurements, Distribution, Terrestrial magnetism, Emissivity, Electron density, High altitude, Oxygen, Intensity, Anomalies, Sodium, Experimental data, Nuclear explosion.

AD-431 088 Div. 2
OTS price $4.60

Army Frankford Arsenal, Philadelphia, Pa.
INVESTIGATION OF SIMULATION REQUIREMENTS FOR THE RAIN ENVIRONMENT.
Rept. no. 1,
by Maurice H. Simpson. July 63, 45p.
Proj. 5B98 09 004
AFA R1697 Unclassified report

Report on Rain Test Procedures Research.

Descriptors: (*Rainfall, Simulation), (*Environmental tests, Rainfall), Raindrops, Distribution, Sensitivity, Surfaces, Penetration, Wind, Materials, Porosity, Porous materials, Aircraft, Guided missiles, analysis, Impact shock, Experimental data.

The report describes investigative research on characteristics of natural rainfall for development of criteria for its simulation in environmental laboratories. An optimum set of rain simulation characteristics was determined that would adequately meet the most common natural rainfall requirements. In nature, distributive rainfall patterns are extremely sensitive to wind. Rainfall samples of nearly equal intensity display wide differences in distribution. Size and velocity of raindrops are more important than the number of raindrops impinging on a surface in a given unit of time and the number of raindrops has no correlation with rainfall intensity. The energy of impingement and ability of raindrops to penetrate are related directly to wind velocities above 20 mph. (Author)

AD-431 110 Div. 2
OTS price $4.60

Michigan U., Coll. of Engineering, Ann Arbor.
QUANTITATIVE INTERPRETATION OF LOW-LEVEL CUMULIFORM CLOUD PATTERNS AS SEEN ON METEOROLOGICAL STAELLITE VIDEOGRAPHS (PRELIMINARY RESULTS).
Final rept.,
by John A. Leese and E. S. Epstein. Feb 64, 43p.
Rept. no. 05631 1 F
Contract Cwb10564, Proj. 05631
Unclassified report

Descriptors: (*Clouds, Distribution), (*Satellites (Artifical), Meteorology), Cloud cover, Meteorological parameters, Cumulus clouds, Anticyclones, Statistical processes, Analysis, Sampling, Meteorological phenomena, Experimental data, Tables.

Interpretation of the cloud patterns as seen from the altitude of meteorological satellites in terms of quantitative meteorological parameters is a complex problem. This study is confined to the low-level cumuliform cloud types associated with the relatively simple synoptic conditions of the semi-permanent oceanic anticyclone. Statistical methods in the form of discriminant analysis techniques are used to determine the synoptic parameters which make a significant contribution in determining the patterns of these low-level cumuliform clouds. Preliminary results have demonstrated the validity of this technique in determining the parameters when the sample size is large. (Author)

AD 431 138 Div. 2
OTS price $11.00

Minnesota U., Minneapolis.
ATMOSPHERIC ENERGY CALCULATIONS,
by John L. Gergen. June 63, 144p. Rept. no. AEB1
Contract Nonr71022
Unclassified report

Descriptors: (*Atmosphere, Energy), Infrared radiation, Mathematical analysis, Meteorological parameters, Humidity, Pressure, Data.

AD-431 181 Div. 2, 6, 12
OTS price $4.60

Aracon Geophysics Co., Concord, Mass.
SYNOPTIC ANALYSIS OF TIROS III RADIATION MEASUREMENTS.
Final rept.,
by Raymond Wexler and Paul Sherr. 31 Jan 64, 41p.
Contract AF19 628 429, Proj. 6698, Task 669803
AFCRL 64 53 Unclassified report

Descriptors: (*Meteorological satellites, Radiation measurement systems), (*Radiation measurement systems, Infrared radiation), Correlation techniques, Radiometers, Temperature, Degradation, Measurement, Albedo, Tropical regions, Troposphere, Solar radiation, Meteorological charts, Clouds, Cloud cover.

TIROS III radiation measurements during July 1961 are analyzed with respect to radiometer deterioration, limb darkening, cloud cover determination, and comparisons with surface and 500 mb synoptic analyses. The patterns of Channel 2 (8-13 microns) equivalent temperature (T sub E) show excellent agreement with TIROS photographs and nephanalyses. They show better agreement with 500 mb than with surface analyses. Lowest T sub E values are generally downwind from a major 500 mb trough position. The short wave troughs are depicted by a characteristic crescent shaped T sub E pattern. Although the pattern generally shows little relation to summer fronts, there is occasionally an excellent fit with open waves. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-429 918 Div. 3, 10
OTS price $9.60

Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
PRESSURE-THRUST RELATIONSHIPS OF VISCO-ELASTIC FLUIDS.
Final rept., 8 Apr-31 Dec 63,
by Earl C. Klaubert and Jack Kahrs. 5 Feb 64, 112p.
Contract DA18 108AMC130A, Proj. 1C522 301A065
Unclassified report

Descriptors: (*Flamethrowers, Pressure), (*Gas-generating systems, Flamethrowers), Ranges (Distance), Thrust, Propellants, Portable, Recoil mechanisms, Solid rocket propellants, Liquid rocket propellants, Flame propagation, Combustion, Weight, Nitrogen compounds, Tetroxides, Hydrazine derivatives.

Two basic approaches were selected for advancing the state-of-the-art of longer range portable flamethrowers. These methods include the multi-shot liquid propellant-actuated recoil-compensated flamethrower and the single-shot solid propellant-actuated recoil-compensated flamethrower. The factors influencing the selection of the liquid flamethrower system, design studies leading to the selection, and the experimental results of this phase of the program are discussed. (Author)

AD-430 248 Div. 3, 10
OTS price $2.60

Engelhard Industries Inc., East Newark, N. J.
EVALUATION OF CATALYTIC FUELS FOR DISSEMINATION.
Semiannual rept. no. 1, 1 July-31 Dec 63,
by Robert C. Langley. 28 Jan 64, 23p.
Contract DA18 108AMC166A
Unclassified report

Descriptors: (*Chemical warfare agents, Diffusion), (*Aerosols, Diffusion), (*Diffusion, Fuels), (*Fuels, Chemical warfare agents), Oxidation, Combustion, Catalysts, Oxidizers, Pellets, Palladium, Carbohydrates, Dyes, Potassium compounds, Chlorates, Hydrazine derivatives, Decomposition, Dextrins, Storage, Ketones, Phenols, Polycyclic compounds, Amines.

The feasibility of disseminating organic compounds by catalytically controlled, flameless combustion reactions was established. Over 150 oxidation formulations were made and studied during reaction and it has been established that payloads in the range of 51 to 64% by weight can be disseminated rapidly. Several precious metal catalysts were investigated; supported palladium has proven useful when present in the range of 0.2 to 0.4% by weight of palladium. Solid fuels such as dextrin and sucrose have proved superior to liquid fuels because of ease of handling. Potassium chlorate was found to be most effective among the oxidizers investigated. Catalytically controlled decomposition reactions using liquid unsymmetrical dimethylhydrazine and solid salts of UDMH were investigated, in a preliminary manner, as energy sources for the dissemination of organic compounds. (Author)

AD-430 254 Div. 3, 16
OTS price $1.60

Midwest Research Inst., Kansas City, Mo.
RESEARCH, DEVELOPMENT AND FARBRICATION OF AN EXPENDABLE BIOELECTROCHEMICAL DETECTOR SYSTEM.
Bimonthly progress rept. no. 5, 1 Dec 63-31 Jan 64,
by Elven K. Bauman. 19 Feb 64, 14p.
Contract DA18 108AMC120A, MRI Proj. 2688B
Unclassified report

Descriptors: (*Chemical warfare agents, Gas detectors), Porosity, Isocyanate plastics, Starches, Gels, Coatings, Polarographic analysis, Inhibition, Enzymes, Cholinesterase, Cholinesterase inhibitors, N-heterocyclic compounds, Polycyclic compounds, Organic nitrogen compounds, Organic sulfur compounds, Iodine compounds, Physostigmine.

This report describes the use of open cell urethane foam pads for supporting the starch immobilized enzyme. Eight per cent starch gel is prepared and enzyme added as the gel cools. Subsequently, foam pads are saturated with the gel, the excess gel squeezed out, and the pads freeze-dried. Experiments show that pads prepared in this manner and exposed to a stream of 1 ml. of substrate and 1-1/2 liters of air per minute will continue to hydrolyze substrate in excess of 2 hr. This report also describes the operation of an experimental detector for a period of 2 hr. and the response of the detector to an enzyme inhibitor. This test employed perforated grid electrodes fabricated from platinum sheet. These electrodes were in contact with the surfaces of the foam pad. The feasibility of bioelectrochemical monitoring of enzyme activity as a method for detecting nerve agents is demonstrated. (Author)

AD-430 974 Div. 3
OTS price $3.60

Monsanto Research Corp., Everett, Mass.
NEW CONCEPT STUDIES, CW DEFENSE.
Bimonthly progress rept. no. 3, 1 Nov-31 Dec 63,
by J. O. Smith, B. M. Fabuss, D. A. Duncan and C. H. Lu. 18 Feb 64, 38p.
Contract DA18 108AMC238A
Unclassified report

Descriptors: (*Chemical warfare agents, Sorption), Adsorption (Physical), G agents, Vapors, Temperature, Physical chemistry, Carbon, Test equipment, Flow meters, Liquids, Surface tension, Factor analysis, Test methods.

The vapor phase flow adsorption unit was rebuilt to eliminate possibilities of contamination by organic material and eliminate or minimize condensation and adsorption effects. The effects of bed size, particle size, bed temperature, flow rate and agent concentration on the adsorption process were studied. A new method for the measurement of contact angle between liquids and powdered solids was developed. This method, based on the determination of the rate of capillary penetration, has several advantages over the maximum capillary rise method. The variables of a liquid-solid system were arranged into dimensionless groups. When these dimensionless groups are plotted on logarithmic coordinates, a single line characterizes a given solid sorbent regardless of particle size, porosity, or sphericity. The same relationship is valid for the sorption of any liquid. The contact angle of a given liquid-solid system can be calculated from this relationship. If was found experimentally that the contact angle was a function of temperature and that the contact angle between water and activated carbon increased as the temperature was increased. (Author)

AD-431 010 Div. 3
OTS price $1.10

Descriptors: (*Aerosols, Analysis), Instrumentation, Cameras, Design, Electrochemistry.

Southern Research Inst., Birmingham, Ala.
DESIGN STUDY TO DEVELOP INSTRUMENTATION FOR FIELD EVALUATION OF CHEMICAL AGENTS.
Monthly progress rept.,
by Alvin N. Bird, Jr. 17 Feb 64, 4p.
Contract DA18 108AMC32A

Unclassified report

The evaluation of the breadboard aerosal flash camera and the studies on the oxime-electrochemical cell were continued. Work has begun on an instrument to measure total agent concentration and on a laboratory model aerosal flash camera. (Author)

4. CHEMISTRY

AD-429 519 Div. 4
OTS price $1.10

California U., Riverside.
(No title).
Final technical rept., 1 Sep 62-31 Oct 63,
by M. Frederick Hawthorne. 31 Oct 63, 4p.
Contract N123 62738 30950A X
Unclassified report

Descriptors: (*Boron compounds, Ionization), (*Complex compouds, Boron compounds), Nuclear magnetic resonance, Spectra (Infrared), Molecular structure, Hydroxides, Potassium compounds, Amines, Ammonium compounds.

AD-429 749 Div. 4
OTS price $3.60

Leicester U. (Gt. Brit.).
NUCLEOPHILIC REACTIONS IN CARBOHYDRATE CHEMISTRY.
Final technical rept., 1 Nov 62-31 Oct 63,
by D. Murphy. 31 Oct 63, 30p.
Contract DA91 591EUC2769
Unclassified report

Descriptors: (*Carbohydrates, Chemical reactions), (*Amines, Synthesis (Chemistry)), (*N-heterocyclic compounds, Synthesis (Chemistry)), Polycyclic compounds, Azides, Organic sulfur compounds, O-heterocyclic compounds, Aromatic compounds, S-heterocyclic compounds, Physical properties, Spectra (Infrared), Molecular rotation.

The powerfully nucleophilic azide ion was used in the preparation of epimino-, diamino-, and amino-mercapto-sugar derivatives. Methyl 4,6-O-benzylidene-2, 3-dideoxy 2, 3-epimino-alpha-D-alloside, and the corresponding mannoside were prepared in excellent yield from the corresponding manno- and allo-epoxides. Methyl 3-azido-3-deoxy-alpha-D-altroside 2-toluene-p-sulfonate and the corresponding 2-azido altroside 3-toluene-p-sulfonate were prepared by acid hydrolysis of 4,6-O-benzylidene compounds. Treatment of these compounds with methanolic hydrazine-hydrate-Raney nickel bave the two 4,6-hydroxy epimines. Treatment of methyl 2, 3-anhydro-4, 6-O-benzylidene-alpha-D-mannoside with thiourea in boiling ethanol gave the 2, 3-epithio-alloside in one step. (Author)
AD-429 749 5 N9
&&&Nucleophilic reactions in carbohydrate chemistry. Use of the azide ion in preparation of epimino-, diamino-, and amino-mercapto-sugar derivatives.

AD-429 761 Div. 4
OTS price $1.10

Stanford Research Inst., Menlo Park, Calif.
OXIDATION OF UNSATURATED HYDROCARBONS.
Final rept., 1 Oct 61-30 Sep 63,
by Dale E. Van Sickle and Frank R. Mayo.
10 Jan 64, 6p.
Contract AF49 638 1102, SRI Proj. PMU3835
AFOSR 64 0025 Unclassified report

Descriptors: (*Alkenes, Oxidation), (*Oxidation, Alkenes), (*Reaction kinetics, Alkenes), Cycloalkanes, Catalysis, Hydroperoxides, Alcohols, Organic solvents, Decomposition, Organic nitrogen compounds, Nitriles, Hydrocarbons.

Research effort for the last two years has been directed principally toward product studies of low temperature, liquid-phase olefin oxidations. Pure hydrocarbons were utilized where possible, azo initiators employed, and conversions limited to 5%. We have attempted to correlate the hydroperoxide produced with the remaining products found and to assign relative rates for two chain propagation reactions. A secondary effort was the study of autocatalysis in oxidation. Cyclopentene was chosen as a model compound, since its oxidation mechanism is the simplest of the olefins studied. Decomposition and initiating properties of hydroperoxides also received attention. (Author)

AD-429 769 Div. 4
OTS price $1.10

Kansas U., Lawrence.
ISOTOPIC MOLECULES: SEPARATION BY RECYCLE GAS CHROMATOGRAPHY.
Interim technical rept. for 1962-1963,
by J. W. Root, Edward K. C. Lee and F. S. Rowland. 1964, 9p.
Grant AF AFOSR62 15
AFOSR 64 0024 Unclassified report

Descriptors: (*Chromatographic analysis, Isotopes), (*Deuterated compounds, Separation), Tritiated compounds, Radioactive isotopes, Stable isotopes, Hydrocarbons, Cyclobutanes.

Gas chromatographic columns, greatly extended in length by the use of paired columns in a recycling apparatus, were used to separate butane (n-C4H10) from deuterated butane (n-C4D10) and methane (CH4) from deuterated methane (CD4). The separation of monotritiated cyclobutane (C4H7T) from cyclobutane (C4H8) is nearly complete. This procedure is generally applicable to a wide variety of separations of isotopic molecules. (Author)

AD-429 776 Div. 4
OTS price $1.60

Florida State U., Tallahassee.
(No title).
Final rept., Feb 58-June 63,
by Ernest Grunwald and Robert A. Kromhout.
June 63, 15p.
Contract AF49 638 278
AFOSR J1359 Unclassified report

Descriptors: (*Molecular structure, Nuclear magnetic resonance), Ammonium compounds, Electrons, Spins, Magnetic moments, Magnetic properties, Molecular association, Protons, Carboxylic acids, Cycloalkanes, Water, Absorption, Ion exchange resins, Chlorine compounds, Ethers, Amides, Single crystals, Instrumentation, Halogenated hydrocarbons.

AD-429 885 Div. 4, 16
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE SPECTRAL AND PHOTOCHEMICAL PROPERTIES OF WATER-SOLUBLE ANALOGS OF CHLOROPHYLL,

by I. G. Savkina and V. B. Yevstigneyev.
6 Feb 64, 17p.
FTD TT63 1008 Unclassified report

Trans. from Biofizika 8:3, pp. 335-343, 1963.

Descriptors: (*Chlorophylls, Spectra (Visible and ultraviolet)), (*Photochemistry, Chlorophylls), Fluorescence, Magnesium compounds, Molecular association, Solvents, Water, Alcohols, Oxidation, Reduction (Chemistry), Ascorbic acid, N-heterocyclic compounds.

A number of properties were investigated of water-soluble derivatives of chlorophylls a and b and pheophytins a and b obtained by alkali hydrolysis of the initial pigments. The absorption spectra of the compounds were measured in methanol, ethanol, and buffer solutions with pH values of 3, 5, 7, 9, and 11; the fluorescence spectra were measured in methanol and a phosphate buffer of pH 7. The photoreduction of water-soluble chlorophyll analogs was demonstrated by adding both dissolved atmospheric oxygen and ascorbic acid in the presence of pyridine. (Author)

AD-429 919 Div. 4
OTS price $2.60

Durham U. (Gt. Brit.).
EFFECTS OF IONIZING RADIATIONS ON AQUEOUS SOLUTIONS OF FORMIC AND OXALIC ACID.
Final technical rept., 1 Nov 62-1 Nov 63,
by Joseph J. Weiss. Nov 63, 22p.
Contract DA91 591EUC2750
Unclassified report

Descriptors: (*Gamma rays, Radiation chemistry), (*Radioactive isotopes, Cobalt), Reaction kinetics, Nitrogen compounds, Oxides, Deuterated compounds, Carboxylic acids, Alcohols, Water, Hydrogen, Hydrogen peroxide.

In neutral aqueous solutions, irradiated with Co60 gamma rays, two reducing species, i.e. the self-trapped electron (negative polaron) thereafter denoted by (H2O)-, and primarily formed H atoms, have been shown to be present. In irradiated 1.6 times 10 to the minus 2M aqueous solutions of N2O a yield of G(N2) -3.2 (molecules/100 eV) was found. This yield, coming from the reaction of negative polarons with N2O, is unaltered in the presence of solutes which do not react with (H2O)-. (Author)

AD-430 021 Div. 4, 25, 26
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
OBJECTS FROM URANIUM DIOXIDE,
by P. P. Budnikov and A. S. Berezhnoy. 9 Jan 64, 7p.
FTD TT63 1012 Unclassified report

Trans. from Tekhnologiya Keramiki i Ogneuporov, Gosstroyizdat, Moscow, pp. 396-399, 1962.

Descriptors: (*Uranium compounds, Oxides), Minerals, Crystal lattices, Thermal conductivity, Heat of formation, Specific heat, Ceramic materials, Semiconductors, Chemical properties, Processing, Corrosion, Stability.

AD-430 104 Div. 4, 25
OTS price $1.10

Columbia U., New York.
OPTICAL PUMPING AND CHEMICAL REACTIONS.
Final rept., 1 Mar 60-28 Feb 62,
by R. Bersohn, R. Bernheim and R. McNeal.
28 Feb 62, 6p.
Contract AF49 638 785
AFOSR 2608 Unclassified report

Descriptors: (*Rubidium, Optical phenemona), (*Atoms, Gases), Spin, Relaxation time, Photosensitivity, Molecules, Vapors, Ultraviolet radiation, Radiation damage, Photochemistry.

An optical pumping apparatus was constructed for rubidium atoms. Measurements of the rubidium spin relaxation time have been made and a theory developed of the relaxation process. Preliminary experiments on the kinetics of photolyses were unsuccessful because of the unexpectedly great reactivity of the photosensitive molecules with rubidium. (Author)

AD-430 146 Div. 4, 14
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION OF INORGANIC SALTS FOR THE PURPOSE OF USING THEM AS HIGH-TEMPERATURE LUBRICANTS,
by M. M. Fialko and A. I. Dintses. 7 Jan 64, 10p.
FTD TT63 1151 Unclassified report

Trans. from Khimya I Tekhnologiya, Topliv I Masel, no. 10, pp. 22-26, 1963.

Descriptors: (*Lubricants, Heat-resistant materials), (*Salts, Lubricants), Corrosion, Water, Absorption, Eutectics, Steel, Nickel alloys, Chromium alloys, Nitrates, Nitrites, Lithium compounds, Potassium compounds, Sodium compounds, Chromates, Chlorides, Bromides, Fluorides, Zinc compounds, Sulfates, Cadmium compounds, Calcium compounds, Tungsten compounds.

AD-430 231 Div. 4
OTS price $1.60

Naval Propellant Plant, Indian Head, Md.
PREPARATION AND PROPERTIES OF SOME PENTAFLUOROPHENYLTIN COMPOUNDS,
by J. L. W. Pohlmann, F. E. Brinckman, G. Tesi and R. E. Donadio. 24 Jan 64, 18p.
NPP TR137 NAVWEPS 8454 Unclassified report

Descriptors: (*Metalorganic compounds, Synthesis (Chemistry)), Aromatic compounds, Fluorine compounds, Tin compounds, Spectra (Infrared), Grignard reagents, Magnesium compounds, Bromides, Alkanes, Alkenes, Boron compounds, Stability.

Pentafluorophenyl magnesium bromide was used successfully as an intermediate for the preparation of some pentaflurophenyltin derivatives. The products obtained in reasonable yields were characterized by elemental analysis and infrared absorption spectra as well as by attempted cleavage reactions. (Author)

AD-430 241 Div. 4
OTS price $1.10

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION LOW-SULFUR EXTRACTS OF SELECTIVE OIL PURIFICATION AND THE PRODUCT OF THEIR THERMAL CRACKING,
by V. I. Zavidov, Z. V. Fedorova and N. I. Shapchenko. 8 Jan 64, 9p.
FTD TT63 1152 Unclassified report

Trans. from Khimiya I Tekhnologiya Toplivi I Masel, No. 9, pp. 23-27, 1963.

Descriptors: (*Oils, Purification), Carbon black, Aromatic compounds, Hydrocarbons, Distillation, Separation, Sulfur, Asphalt, Tar.

Results are presented from the investigation of the chemical composition and properties of the extract of phenol purification of distillate raw material and a mixture of distillate and residual extracts from a mixture of journal and crankcase petroleum products, this investigation having been carried on for the purpose of finding out the possibility of using extracts as raw material for the production of active furnace carbon black. Research was also done on the product of thermal cracking of a mixture of extracts. (Author)

AD-430 368 Div. 4, 25
OST price $9.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
RADIATIVE PROPERTIES OF HIGH-TEMPERATURE OXYGEN AND NITROGEN.
Final rept.,
by D. E. Buttrey and J. B. Gibson. Jan 64, 114p.
Contract AF29 601 5006, Proj. 7811, Task 781101
RTD TDR63 3047 Unclassified report

Descriptors: (*Oxygen, High-temperature research), (*Nitrogen, High-temperature research), Shock tubes, Spectra (Infrared), Spectra (Visible and ultraviolet), Atomic structure, Atomic spectroscopy, Photoelectric effect, Electron transitions, Spectrographic cameras, Radiation measurement systems.

Preliminary values for the photoelectric cross sections of excited states of atomic oxygen were obtained from measurements of the continuum intensity in the visible wavelength range for temperatures in the range of 12,000 to 16,000 K. (Author)

AD-430 478 Div. 4
OTS price $4.60

Birkbeck Coll. (Gt. Brit.).
STUDIES IN ION SOLVATION IN MIXED SOLVENTS.
Final technical rept., 1 Dec 62-30 Nov 63,
by D. Feakins. 30 Nov 63, 50p.
Contract DA91 591EUC2741
Unclassified report

Descriptors: (*Electrochemistry, Mixtures), (*Solvates, Electrochemistry), (*Electrolytic cells, Ions), (*Ions, Solvent action), Alcohols, Water, Solvents, Electrolytes, Hydrogen compounds, Chlorides, Bromides, Iodides, Hydroxides, Sodium compounds, Lithium compounds, Potassium compounds, Electrodes, Silver, Silver compounds, Hydrogen, O-heterocyclic compounds, Dissociation, Boric acids, Chemical equilibrium, Solutions.

Using the appropriate chemical cells, the free energies to transfer of the pairs of ions H(+)Br(-) and H(+)I(-) in the standard state have been determined for transfers from water to 20% mixtures of dioxan and water at 25 degrees. A by-product of the measurements is the dissociation constant of boric acid in the mixed solvent. Considerable experimental difficulties have been encountered and overcome in these measurements. (Author)

AD-430 510 Div. 4, 25
OTS price $4.60

Sheffield U., (Gt. Brit.).
THE KINETICS OF EXCIMER FORMATION IN FLUID MEDIA.
Final technical rept., 1 Dec 62-30 Nov 63,
by Brian Stevens, Miklos I. Ban, and Michael S. Walker. 30 Nov 63, 50p.
Contract DA91 591EUC2745
Unclassified report

Descriptors: (*Fluorescence, Fluids), Fluorine compounds, Dynamics, Excitation, Aromatic compounds, Entropy, Enthalpy, Energy, Phosphorescence, Hydrocarbons, Polycyclic compounds.

The ratio of molecular to excimer fluorescence intensities has been measured as a function of temperature for concentrated solutions of 2-methylnaphthalene, 1-fluoronaphthalene, acenaphthene and 1,2-benzanthracene in low-viscosity solvents. Values of 5-6 kcal/mole obtained for the heats of photoassociation are significantly lower than that of 11 kcal/mole found for pyrene, and indicate that the repulsion energy between unexcited molecules in the excimer configuration is largely responsible for the red-shift of some 6000cm-1 to the-1 power of the excimer band with respect to the molecular spectrum. The corresponding entropies of photoassociation are estimated to lie within the range of -20 to -28 e.u.. (Author)

AD-430 515 Div. 4, 25
OTS price $1.60

General Dynamics, Fort Worth, Tex.
HYDROTHERMAL SYNTHESIS OF R2SiO4 COMPOUNDS,
by Arthur J. Ehlmann. 1 Sep 63, 11p. Rept. no. ERR FW221
Contract AF33 657 11214
Unclassified report

Descriptors: (*Minerals, Synthesis (Chemistry)), (*Silicates, Crystal structure), Crystal lattices, Iron compounds, Magnesium compounds, Silicic acids, Oxides, Salts, X-ray diffraction analysis, Goniometers, Solid solutions, Oxalates.

The mineral synthesis research has evolved into two different studies: first, ferrites and the effects of ultrahigh pressure treatment; second, hydrothermal synthesis of R2SiO4 (olivine-type) minerals. The second study was instigated to fill time gaps in the ferrite progress. The pressure system for the hydrothermal synthesis equipment was completed and the synthesis of olivine group minerals was begun immediately. The olivines are neosilicates with an ideal chemical formula of R2SiO4, where R can be Mg+2, Fe+2, Mn+2, Ca+2, and other divalent metals. The olivine structure consists of individual SiO4 tetrahedra bound together by the divalent cations. (Author)

AD-430 547 Div. 4
OTS price $1.60

Missouri School of Mines and Metallurgy, Rolla.
ANODIC DISINTEGRATION OF ZINC UNDERGOING ELECTROLYSIS IN NITRATE SOLUTIONS,
by W. J. James, G. E. Stoner and M. E. Straumanis. July 63, 12p. Technical rept. no. 4
Contract Nonr229603
Unclassified report

Descriptors: (*Zinc, Anodes (Electrolytic cell)), (*Corrosion, Zinc), (*Electrolytic cells, Oxidation-reduction reactions), Electrochemistry, Electrodes, Degradation, Zinc compounds, Hydroxides, Electrolytes, Nitrates, Potassium compounds.

A dark corrosion product forms on zinc during electrolysis in nitrate solutions but does not form when the electrode is amalgamated or when it is dissolved in chloride or sulfate solutions.

Optical and x-ray studies revealed that the dark film is composed of many small metallic zinc particles embedded in a matrix of Zn(OH)2. During electrolysis this film spolls off the electrode and reacts with the electrolyte, subsequently turning white. It is concluded that the normal valency of zinc ion does not change during anodic dissolution in nitrate solutions, but rather that the apparent valency of less than two arises as a consequence of partial disintegration of the anode. The small metallic particles may then directly or indirectly reduce the oxidizing electrolyte. The dissolution of zinc outside the electrical circuit thus accounts for the lower coulombic equivalent. (Author)

AD-430 560 Div. 4
OTS price $4.60

Army Frankford Arsenal, Philadelphia, Pa.
RESEARCH CONDUCTED ON SECRETARY OF THE ARMY RESEARCH AND STUDY FELLOWSHIP IN THE GENERAL FIELD OF PHYSICAL ORGANIC CHEMISTRY,
by J. Radell. Nov 63, 39p.
AFA R1698 Unclassified report

Descriptors: (*Radiation chemistry, Scientific research), (*Complex compounds, Urea), (*Alkynes, Polymerization), (*Polymers, Alkynes), Gamma rays, Aromatic compounds, Molecular rotation, O-heterocyclic compounds, Thiols, Esters, Carboxylic acids, Bromine compounds, Iodine compounds, Dosimeters, Synthesis (Chemistry), Optical properties.

A general review of the various activities of the author in the general field of Physical Organic Chemistry while on a Secretary of the Army Research and Study Followship is presented. Some general observations are given which resulted from visits to various laboratories in Israel and Western Europe. In addition, all the published, presented, and completed research of the author which occurred during this Fellowship period is presented or summarized. Three main subjects were pursued; (1) Effect of Gamma Radiation on Optically Organic Compounds; (2) Urea Inclusion Compounds; and (3) Energetic Acetylenic Compounds. (Author)

AD-430 716 Div. 4, 10
OTS price $3.60

ITT Research Inst., Chicago, Ill.
RESEARCH ON CHEMISTRY OF O3F2 AND O2F2.
Annual summary rept., 1 Oct 62-31 Dec 63,
by Irvine J. Solomon. 19 Feb 64, 37p. Rept. no. IITRI C227 6
Contract AF49 638 1175, Proj. C227
Unclassified report

Descriptors: (*Oxidizers, Chemical reactions), (*Fluorine compounds, Chemical reactions), (*Oxygen compounds, Chemical reactions), Ions, Complex compounds, Boron compounds, Fluoborates, Fluoroamines, Sulfur compounds, Phosphorus compounds, Iodides, Bromides, Chlorine, Perchlorates, Ammonium compounds, Nitrogen compounds, Vapor pressure, Spectra (Infrared), Paramagnetic resonance, Decomposition, Hydrolysis, Physical properties, Fluorination, Nitric acid, Sodium compounds, Potassium compounds.

AD-430 724 Div. 4, 30
OTS price $.50

Coating and Chemical Lab., Aberdeen Proving Ground, Md.
AN ADAPTATION AND EXTENSION OF A QUANTITATIVE INFRA-RED METHOD FOR THE ESTIMATION OF THE NITROGEN RESIN CONTENT OF MODIFIED ALKYDS,
by M. L. Adams. 10 Jan 64, 11p.
Proj I H 024401A110 05
CCL 153 Unclassified report

Descriptors: (*Polyester plastics, Chemical analysis), Absorption spectrum, Spectra (Infrared), Nitrogen, Plastic coatings, Plastics, Quantitative analysis.

An adaptation and extension of a previously published infra-red absorbance ratio method for the analysis of vacuum dried films of nitrogen resin modified phthalic alkyd resins is outlined and show improved accuracy and the inclusion of the determination of benzoguanamine-formaldehyde not previously covered. (Author)

AD-430 746 Div. 4, 14
OTS price $1.50

Research and Technology Div. Air Force Systems Command, Edwards, Calif.
INVESTIGATION OF BASIC FACTORS INVOLVED IN THE FORMATION AND CHARACTERIZATION OF ALUMINUM COMPLEX IMIDO ACIDS AS HIGH TEMPERATURE GREASE THICKENERS.
Rept. for Aug 62-May 63,
by Ernest L. Plummer. Dec 63, 58p.
Proj. 3044, Task 304403
ASD TDR63 884 Unclassified report

Report on Aerospace Lubricants.

Descriptors: (*Lubricant additives, Heat resistant materials), (*Synthesis (Chemistry), Lubricant additives), Complex compounds, Aluminum compounds, Amides, Carboxylicacids, Microscopy, Electron microses, Greases, Spectra (Infrared), Photomicrography, N-beterocyclic compounds, Polycyclic compounds, Ketones.

The study of imides and aluminum complex imido acids as high temperature grease thickeners is presented. Part of this effort was to study the effect of the chemical and physical properties of a thickener on the physical peoperties of a grease. The preliminary work on this study is described. The preparation of 14 imido acids as well as the formulations for a series of greases by a variety of methods as described. Variations in the formulation of an aluminum complex imido acid grease have resulted in a grease which ran 737 1/2 hours on the Pope Spindle bearing rig at 500F and 10,000 rpm. We found by optical and electron microscopic examination that most of these greases were made of fairly large rod-like particles. The data was limited, but we show a direct relationship between the length of these particles and the consistency of the grease. (Author)

AD-430 794 Div. 4, 16
OTS price $1.10

Maryland U., College Park.
CHROMIUM COMPLEXES OF INSULIN AND RELATED COMPOUNDS.
Annual progress rept. 1 Jan 63-1 Mar 64,
by Carl L. Rollinson. 1 Mar 64, 10p.
Contract DA49 193MD2444
Unclassified report

Descriptors: (*Chromium compounds, Complex compounds), (*Complex compounds, Synthesis (Chemistry)), (*Insulin, Effectiveness), Chelate compounds, Colorimetric analysis, Salts, Oxalates, Hydroxides.

A number of chromium compounds were subjected to in vitro tests to determine the relation between their structure and their effectiveness in enhancing the action of insulin. Results indicate that the effect is strongly dependent on the com-

position of the chromium compound and in particular that the most active compounds are polynuclear, the polynucleate structure of those tested being due to olation. Investigation of synthetic methods for preparing such compounds of known chain length has been started. Preliminary work was done on the possible formation of chromium complexes under conditions similar to those of the digestive system. Rapid methods for determining chromium were studied; a spectrophotometric procedure described in the literature was checked and is in use, and a method based on separation of $Cr(OH)_3$ from organic matter is under investigation. (Author)

AD-430 801 Div. 4
OTS price $1.10

Tulane U., New Orleans, La.
X-RAY INVESTIGATIONS. COPPER(II) CHLORIDE COMPLEXES WITH SUBSTITUTED PYRIDINE N-OXIDES. COPPER(II) COMPOUNDS WITH SUBNORMAL MAGNETIC MOMENTS,
by H. B. Jonassen, Yoneichiro Muto and M. Kato.
18 Feb 64, 8p. Status rept. no. 7
Contract Nonr47509, Proj NR052 424
Unclassified report

Descriptors: (*Copper compounds, Complex compounds), (*Complex compounds, Copper compounds), (*Pyridines, Complex compounds), (*Quinolines, Complex compounds), Chlorine compounds, Metal-organic compounds, Oxides, Spectra (Visible and ultraviolet), Absorption spectrum, Magnetic propertis, Dissociation, Synthesis (Chemistry), Ketones, Aldehydes, CAromatic compounds, Ions, X-ray diffraction analysis, Chelate compounds, Chlorides, Nitrates.

The following complexes were prepared and their magnetic properties at room temperature and Uv and visible absorption spectra were studied: 4-Nitroquinoline N-oxide copper(II) chloride; Bis-4-nitroquinoline N-oxide copper(II) chloride; 3-Methylpyridine N-oxide copper(II) chloride; 4-Methylpyridine N-oxide copper(II) chloride; 4-Chloropyridine N-oxide copper(II) chloride; 4-Hydroxypyridine N-oxide copper(II) chloride; 2, 6-Dimethylpyridine N-oxide copper(II) chloride. The 8-hydroxy-2-methylquinoline, salicylaldehyde and acetylacetone ligands have similar functional groups and produce compounds with the same empirical formula under the same reaction condition. However, for Cu(AcAc)C1 different magnetic properties are observed. It is postulated that in Cu(AcAc)C1 a chloridebridged structure exists, whereas the others seem to have the oxygen bridged structure

AD-430 803 Div. 4
OTS price $3.60

Callery Chemical Co., Callery, Pa.
STUDIES OF COMPLEX PERCHLORATES.
Annual rept.
by C. R. Guibert and A. D. McElroy. 10 Feb 64, 34p.
Contract Nonr394300
Unclassified report

Descriptors: (*Complex compounds, Perchlorates), (*Perchlorates, Synthesis (Chemistry)), Stability, Heat, Hydrolysis, Aluminum compounds, Potassium compounds, Guanidines, Hydrazine, Nitrates, Organic nitrogen compounds, Lithium compounds, Zinc compounds, Ammonium compounds, Titanium compounds, Chromium compounds, Boron compounds, Amines, Enthalpy, Heat of formation, Sensitivity, Shock (Mechanics), Chlorides, Molecular structure.

Results of continuing investigations of complex perchlorates are reported. Four new compounds, $NH_4Al(ClO_4)_4$, $NO_2Al(ClO_4)_4$, $NO_2Zn(ClO_4)_3$ and $LiZn(ClO_4)_3$ were prepared in good purity, while a less pure complex of titanium ($(NO_2)_2Ti(ClO_4)_6$) was synthesized. Various properties of these and other available compounds were studied. (Author)

AD-430 823 Div. 4, 14
OTS price $1.10

Notre Dame U., Ind.
SYNTHESIS AND EVALUATION OF POLYMERS WITH SPECIAL PROPERTIES,
by G. F. D'Alelio and R. C. Evers. 10 Jan 64, 7p.
Rept. no. 3
Contract DA11 022AMC169A
Unclassified report

Descriptors: (*Polymers, Synthesis (Chemistry)), Alkenes, Alkynes, Boranes, Esters, Acetates, Alcohols, Carboxylic acids, Chlorine compounds, Decaboranes, Spectra (Infrared), Anhydrides, Cyclohexanes, Acrylic resins.

Further attempts were made to replace the acidic hydrogen of the terminal acetylene groups of the acrylate monomers using propargyl acrylate as the key reactant. High dilution techniques and various reaction solvents were to be used in order to ascertain the feasibility of replacing the acidic hydrogen with various other groups. Due to the appearance of a number of articles dealing with the addition of decaborane to acetylenic bonds, it was decided to further explore this phase of the project. Efforts would be made to repeat some of the syntheses reported in these articles in order to apply the described techniques to this project, and to develop techniques applicable to the purification of a polymer containing the carborane nucleus. Also, an attempt would be made to prepare 1-acryloxy, 1-ethynyl cyclohexane, a new moner containing a terminal acetylene group. (Author)

AD-430 903 Div. 4
OTS price $8.10

Technische Hochschule, Vienna (Austria).
KINETIC STUDY OF THE MECHANISM OF REACTIONS OF AROMATIC HYDROXY COMPOUNDS WITH NITROUS ACID AND NITRIC ACID IN NON AQUEOUS SOLVENTS AT VARIOUS TEMPERATURES.
Annual technical rept., 1 Jan-31 Dec 63,
by Hermann Schmid. Jan 64, 85p.
Contract 91 591EUC2680
Unclassified report

Descriptors: (*Phenols, Reaction kinetics), (*Reaction kinetics, Phenols), Organic nitrogen compounds, Aromatic compounds, Alcohols, Organic solvents, Perchloric acid, Hydrochloric acid, Chlorine compounds, Absorption spectrum, Spectra (Infrared), Halogenated hydrocarbons, Nitrogen compounds, Oxygen compounds, Ethers, Complex compounds, Heat of activation, Enthalpy, Entropy, Isomeric transitions, Tables, Amines, Nitrates.

Nitrosation of phenol in methanol proceeded at low concentrations of the reactants phenol and nitrous acid, and low HCl concentration very slowly, so that no definite kinetics could be ascribed to this reaction. Rate equations of the diazotisation of the mononitroanilines in methanol, acidified either with $HClO_4$ acid or with HCL, were determined at different temperatures. The kinetics of the diazotisation of the chloranilines is similar to that of aniline. The absolute rate coefficients and the thermodynamic values: free activation enthalpy, activation enthalpy and activation entropy were determined. (Author)

AD-430 906 Div. 4
OTS price $2.60

Texaco Experiment, Inc., Richmond, Va.
INVESTIGATION OF THE DISSOCIATION CHEMISTRY OF -NF2 COMPOUNDS.
Quarterly summary rept., Aug-Oct 63,
by U. V. Henderson, Jr., P. L. Goodfriend, H. A. Rhodes and H. P. Woods. 1 Nov 63, 21p. Rept. no. EXP223, TM1470
Contract Nonr188300
Unclassified report

Descriptors: (*Nitrogen compounds, Dissociation), (*Fluorine compounds, Dissociation), Heat, Mass spectrum, High-temperature research, Compressive properties, Helium, Argon, Nitrogen, Photochemistry, Oxidizers, Pyrolysis.

Thermal dissociation experiments using adiabatic compression as the means of heating were discontinued. A study of the adiabatic compression process in the TEI apparatus showed that because of the mechanical properties of the compressor and the high thermal conductivity of helium, a maximum temperature constant enough for kinetic and mechanism studies was not obtained. Modification of the apparatus to correct the difficulty does not seem warranted, and the use of argon rather that helium to minimize the heat loss problem would obscure the mass spectra used for analysis of the dissociation process. During this report period the flash photolysis of NF3 was reexamined, using a sample cell and flash tube arrangement that permitted the use of photolysis radiation as low as 1600A. No new features in the spectra of the flashed NF3 attributable to dissociation of the NF3 were observed. Equipment is being modified to allow flash photolysis kinetic spectroscopy spectra to be obtained in the vacuum ultraviolet region. (Author)

AD-431 013 Div. 4, 14, 25
OTS price $5.60

Air Products and Chemicals, Inc., Allentown, Pa.
INVESTIGATION OF THE PARA-ORTHO SHIFT OF HYDROGEN.
Final rept., Mar-Sep 62,
by R. G. Clark, J. F. Kucirka, A. Jambhekar and G. E. Schmauch. Oct 63, 52p.
Contract AF33 616 7506, Proj. 3048, Task 30193
ASD TDR62 833, pt. 2 Unclassified report

Report on Aviation Fuels.

Descriptors: (*Hydrogen, Cryogenics), (*Catalysts, Hydrogen), (*Heat transfer, Hydrogen), Liquefied gases, Catalysis, Heat of activation, Particle size, Reaction kinetics, Adsorption, Surfaces, Separation, Magnetic properties, Paramagnetic materials, Gels, Iron compounds, Refrigeration systems, Rocket motors (Liquid propellant), Oxides.

Investigations of the low-temperature, heterogeneous catalysis of the para-ortho shift of hydrogen for the recovery of the endothermic heat of conversion as low-temperature refrigeration are reported. The research program included: studies of the effects of catalyst activation temperature, particle size, and chamber diameter on conversion activity; adsorption studies; the determination of separation factors of advanced catalysts; and preliminary work to determine the magnetic properties of advanced catalysts. An extensive catalyst development program resulted in improved catalyst systems for the conversion. The most advanced catalyst shows an activity 10.5 times more effective, on a weight basis, than hydrous ferric oxide gel which is the best commercial catalyst available for the conversion. (Author)

AD-431 066 Div. 4
OTS price $4.60

Superior Inst. of Health (Italy).
SPECTROCHEMICAL ANALYSIS OF NON-METALS IN THE VACUUM ULTRAVIOLET BY MEANS OF A HOLLOW CATHODE LIGHT SOURCE.
Final rept., 1 Jan-31 Dec 63,
by Giulio Milazzo. 31 Dec 63, 48p.
Contract DA91 591EUC2752
Unclassified report

Descriptors: (*Ultraviolet spectroscopy, Vacuum apparatus), Line spectrum, Arsenic, Bromine, Carbon, Chlorine, Iodine, Silicon, Instrumentation, Cathodes, Light, Sources.

The research object has the scope to ascertain the feasibility of a spectrochemical analysis of non metals in the vacuum ultraviolet (VUV) utilizing the principle of the hollow cathode light source. An extended survey of the already performed work in this direction showed that very few experimental material was available, but that the theoretical considerations, indicating as very probable a better sensitivity of the spectrochemical analysis, at trace level, utilizing the principle of the hollow cathode light source could be considered as experimentally confirmed. Further theoretical considerations showed that the most sensitive lines of the non metallic elements should be the resonance lines lying in the VUV region of the spectrum, so that a particular construction of this kind of light source had to be realized, capable to produce the desired spectrum in the desired spectral region and capable to be connected by means of an air free light path with a suitable vacuum spectrograph. (Author)

AD-431 090 Div. 4, 25
OTS price $2.60

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena.
NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY. THE EFFECT OF STRUCTURE ON MAGNETIC NON-EQUIVALENCE DUE TO MOLECULAR ASYMMETRY,
by George M. Whitesides, David Holtz and John D. Roberts. Jan 64, 29p. Rept. no. TR29
Contract Nonr22026, Task NR055 388
Unclassified report

Descriptors: (*Nuclear magnetic resonance, Molecular structure), (*Protons, Resonance), Synthesis (Chemistry), Aromatic compounds, Cycloalkanes, Ethers, Alcohols, Magnetic properties.

The difference in chemical shift between the methylene protons of a number of compounds related structurally to 1-phenylethyl benzyl ether has been measured. Correlations between structural features of these compounds and the magnitude of the magnetic non-equivalence induced by the center of molecular asymmetry provide basis for qualitative identification of the most important factors contributing to the chemical-shift difference. (Author)

AD-431 141 Div. 4
OTS price $.50

Naval Research Lab., Washington, D. C.
NUCLEAR SUBMARINE ATMOSPHERES. PART 2 DEVELOPMENT OF A TOTAL HYDROCARBON ANALYZER.
Interim rept.,
by J. E. Johnson, M. E. Umstead, and W. D. Smith.
30 Jan 64, 6p.
Proj. WW041; SP89422
NRL 6064 Unclassified report

Descriptors: (*Nuclear powered vessels, Submarines), (*Submarines, Atmosphere), (*Atmosphere, Monitors), Instrumentation, Test methods, Chromatographic analysis, Carbon compounds, Detectors.

An instrument has been developed for the ship board monitoring of total hydrocarbons in nuclear submarine atmosphere. In addition to hydrocarbons, the instrument also measures methane and Freon 12 and, with a slight modification in operating procedure, Freon 11. The system is based upon a chromatographic technique coupled with a highly sensitive flame ionization detector. An air sample is injected into a chromatographic column and chromatographed in the usual manner until the methane and Freon 12 peaks emerge. At this point, the flow of carrier gas is reversed and the higher hydrocarbons are backflushed from the column through the detector as a single peak. The area under the backflushed peak provides a measure of the total hydrocarbon content of the atmosphere. The principles on which the instrument is based have been successfully tested at sea aboard the U.S.S. SCULPIN. (Author)

5. COMMUNICATIONS

AD-429 522 Div. 5, 8
OTS price $9.10

General Precision Lab., Inc., Pleasantville, N. Y.
ELECTRO-OPTICAL DISPLAY SURFACE.
Final technical rept.
Nov 63, 77p.
Contract AF30 602 2745, Proj. 5578, Task 557803
RADC TDR63 101 Unclassified report

Descriptors: (*Display systems, Design), (*Light, Reflection), Magnetic drives, Electronic switches, Electronic scanners, Magnet coils.

This report describes the effort exerted during the design, development, fabrication and test of a magneto-optical display surface, hereafter referred to as a Reflective Display. Results of the investigation including supporting analyses and tests on a feasibility model of a reflective display conclusively prove that techniques of light absorbing and reflecting surfaces can be suitably controlled for application in large-scale data display systems. Investigations indicate that if effort is maintained, this magneto-optical display technique will lead to a successful large-scale display panel. (Author)

AD-429 786 Div. 5, 2
OTS price $12.00

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
COMMUNICATION VIA SEISMIC WAVES,
by Kurt Ikrath and Wilhelm Schneider. May 63, 155p.
Task 3A99 25 003 02
AELRDL TR2346 Unclassified report

Descriptors: (*Communication systems, Seismic waves), (*Seismic waves, Transducers), (*Transducers, Seismic waves), Geology, Propagation, Theory, Mechanical properties, Acoustic impedance, Resonance, Elasticity, Vibration, Mathematical analysis.

The design and performance of experimental seismic transducers are discussed. The significance of the results of experiments with these transducers for seismic communication, active seismic surveillance, and geological research is emphasized. (Author)

AD-429 829 Div. 5
OTS price $2.60

ITT Communication Systems, Inc., Paramus, N. J.
STUDY OF SAC BASE NON-TACTICAL RADIO SYSTEMS.
31 Aug 62, 18p. Rept. no. 62TR72
Contract AF19 626 5
ESD TDR63 688 Unclassified report

Descriptors: (*Radio communication systems, Strategic air command), Voice communication systems, Mobile, Frequency modulation, Networks, Radiotelephones, Radio operators, Radio stations, Radio transmission.

An analysis is presented of the non-tactical mobile radio services in use on Strategic Air Command (SAC) bases in terms of existing operating requirements, and to offer recommendations for necessary improvements. A discussion of the new spread spectrum systems is also presented. The survey made of non-tactical radio systems in use on various SAC bases indicated that existing systems and conventional equipment, with one exception, meet the present operating requirements. Each network controller is usually able to establish radio contact with his mobile units as required. The exception occurs in bases comprising missile squadrons widely dispersed over irregular terrain. In that situation, the mobile units can be out of range of the network controller's base station. To achieve greater area coverage, each mobile unit should have a channel switching capability to permit operation in its own network and in a central base mobile telephone type net. This central base network must provide effective coverage of all parts of the base, to insure that vehicles can establish contact in emergency conditions. Random access discrete address type systems are not recommended for this application. (Author)

AD-429 845 Div. 5
OTS price $2.60

North Electric Co., Galion, Ohio.
STUDY OF AUTOMATIC ROUTING IN A SWITCHED SYSTEM UTILIZING SATURATION SIGNALING.
Quarterly rept. no. 2, 1 July-30 Sep 63,
by H. Hambrock, H. Rondina and S. Sternung.
30 Sep 63, 21p.
Contract DA36 039AMC02281E
Unclassified report

Descriptors: (*Telephone communication systems, Military requirements), (*Programming (Computers), Models (Simulations)), (*Switching circuits, Multiple operation), (*Multiple operation, Switching circuits), (*Models (Simulations), Programming (Computers)), Sealers, Delay lines, Telephone lines, Automatic.

The status of present studies and the proposed areas of future studies of automatic routing in a system utilizing Saturation Signaling are covered in this report. Included are: description of network simulators, study of problems related to mechanization of the system, results of theoretical traffic studies, and the direction of future studies. (Author)

AD-430 058 Div. 5, 30, 15
OTS price $6.60

Rias, Inc., Baltimore, Md.
INVESTIGATION OF FILTER FUNCTIONS.
Final technical rept.,
by R. E. Kalman. Jan 64, 65p.
Contract DA36 034ORD3708Z, Proj. 1B222901A204
Unclassified report

Descriptors: (*Adaptive control systems, Filters (Electromagnetic wave), Functions, Polynomials, Curve fitting, Least squares method, Computer logic, Feedback, Optimization, Stochastic processes, Communication theory, Probability, Mathematical analysis.

Results are presented of the first phase of a basic research program in adaptive filtering. The construction of optimal filters in the Wiener-Kalman-Bucy sense requires knowledge of the statistics (second-order properties) of the underlying random processes; the filter is called adaptive when such prior knowledge is not assumed but is obtained in real time by analysis of the observed random signals. The theoretical considerations of this work are based on the following Variational Principle of Adaptation. One examines simultaneously a large number of filters each one of which is optimal for certain types of random signals. At each moment of time the output is taken from that filter which gives the smallest real-time error up to time t. In

this way the unknown random process that generates the observed signal is identified indirectly. Experimental (digital computer) results are presented which confirm the logical correctness of the Principle. (Author)

AD-430 070 Div. 5
OTS price $10.50

Collins Radio Co., Dallas, Tex.
STUDY OF ATCRBS DATA TRANSFER OVER EXISTING FAA RML EQUIPMENT.
Final rept.
July 63, 131p. Rept. no. D1695
Contract ARDS631, Proj. 112D
Unclassified report

Descripors: (*Radar beacons, Data transmission systems), (*Data transmission systems, Radar beacons), (*Test methods, Data transmission systems), Bandwidth, Multiplex, Measuring devices (Electrical & electronic), Modulation, Performance (Engineering), Propagation, Microwave equipment.

The purpose of this study program is to furnish FAA evaluating engineers with data relative to the Beacon Video Channel performance of FAA RML-4 Radar Microwave Link systems. Accordingly, a test system consisting of RML-4 terminal and repeater equipment was assembled and evaluated. The test methods, equipment used, and the acquired data are contained in this report. Detailed beacon video channel performance data are presented herein with particular emphasis on the performance characteristics when the system is loaded with pulse trains corresponding to 4096 beaon Codes. In addition, these tests were made under simulated in the field conditions such that the acquired data would represent practical system performance rather than performance in a laboratory environment. A brief investigation was also performed to evaluate the system video performance as a function of microwave frequency drift. (Author)

AD-430 081 Div. 5
OTS price $10.50

ITT Federal Labs., Nutley, N. J.
TRUNK TERMINAL TELEGRAPH AND DATA TRANSMISSION SYSTEM,
by H. Place, A. Saldutti and B. Eden. July 61, 135p.
Proj. 480L, Task C3031 0241
Unclassified report

Subcontract to ITT Communication Systems, Inc., Paramus, N. J. Contract AF19 626 5.

Descriptors: (*Data transmission systems, Feasibility studies), (*Telephone equipment, Data transmission systems), (*Radio equipment, Data transmission systems), Errors, Performance (Engineering), Modulation, Detection, Transmission lines, Noise (Radio), Telegraph equipment.

A number of high-speed data transmission equipments (data modems), which were in the development and early test stages eighteen months ago, are now available in the industry. Several modems have proved reliable and practical when operated at signaling rates in the order of 2400 bits per second. Characteristics of telephone transmission line parameters and certain vagaries of the telephone network itself are still restricting low-error, high reliability performance at signaling rates over 3000 bits per second. This report, which surveys the progress made during the past eighteen months in data modem development and manufacture, covers: data modem design concepts and modem selection considerations; detailed equipment descriptions covering ten leading data modems; data modem error performance test results; ancillary data transmission equipments; and an updated data transmission bibliography. (Author)

AD-430 101 Div. 5
OTS price $12.00

Collins Radio Co., Cedar Rapids, Iowa.
X-BAND MASER RECEIVER COMPLEX.
Final rept.
Jan 64, 161p. Rept. no. CRR279
Contract AF33 657 8604, Proj. 4335, Task 433501
RTD TDR63 4199 Unclassified report

Descriptors: (*Masers, Microwave communication systems), (*Communication satellites (Passive), Masers), (*Microwave communication systems, Communication satellites (Passive)), Parabolic antennas, X band, Air to surface, Simulation, Antenna feeds, Preamplifiers, Signal-to-noise ratio, Servomechanisms.

A receiving complex is described. It was installed at the Trebein site near Wright-Patterson Air Force Base and was to be used as the ground receiving station for Project Leapfrog. The system was designed to study the capability and performance using a belt of orbiting resonant dipoles as reflectors for microwave communications. A twin cavity maser preamplifier is used to obtain low-noise performance at 7750 and 8350 mc. The measured equivalent noise temperature of the receiver is approximately 50 K. A 13.5-foot parabolic reflector is used, having a high F/D ratio. This resulted in extremely low side-lobe gains, thereby increasing the system signal-to-noise ratio. The antenna is mounted upon a modified SCR-584 radar mount. The system local oscillator has a short-term stability of 1 x 10 to the -8th power, permitting accurate signal frequency determination. The oscillator stability is obtained by the use of crystal oscillator and varactor multipliers. (Author)

AD-430 118 Div. 5
OTS price $8.10

ITT Federal Labs., Palo Alto, Calif.
PERFORMANCE STANDARDS AND TEST SPECIFICATIONS FOR VOICE MESSAGE AMPLITUDE AND BANDWIDTH COMPRESSION EQUIPMENT.
Final rept.
31 Oct 60, 83p.
Contract AF30 635 12857, Proj. 480L, Task C1185 01 00
ESD TDR63 690 Unclassified report

Descriptors: (*Voice communication systems, Performance (Engineering)), (*Specifications, Voice communication systems), Speech recognition, Sound signals, Mathematical analysis, Audio amplifiers, High-pass filters, Low-pass filters, Band-pass filters, Measuring devices (Electrical & electronic), Bandwidth, Speech compression.

The performance standards used for speech communication systems now in service are based upon electrical measurements, such as the frequency response, the signal-to-noise ratio, and the percent of signal distortion. A simple illustration, where totally unacceptable electrical responses do not indicate user effect, is the use of a poor signal-to-noise ratio. A conversation over a channel with S/N ratio of 100db

is (under most circumstances) quite acceptable for intelligibility and recognition but is an untenable transmission condition. Such an illustration implies the existence of more fundamental transmission parameters when the user(s) are included in the loop than may be measured by standard electro-mechanical methods. The problem encountered in this study is the identification and description of these fundamental transmission parameters and the establishment of methods to be used in the measurement thereof. This report includes a definition of three of the basic communication performance parameters, the results of experiments conducted to measure two of these three features, a detailed procedure specification for aesthetic quality measurements and recommendations for further investigations. (Author)

AD-430 415 Div. 5
OTS price $1.60

ITT Communication Systems, Inc., Paramus, N. J.
EUROPEAN-MEDITERRANEAN TROPOSPHERIC SCATTER COMMUNICATION SYSTEM PERFORMANCE SPECIFICATION IN-BAND SIGNALING EQUIPMENT.
1 Apr 62, 14p. Rept. no. 61SPEC120
Contract AF19 626 4
ESD TDR63 694 Unclassified report

Descriptors: (*Voice communication systems, Specifications), Troposphere, Scattering, Circuits, Communication systems, Communication equipment.

This specification forms a part of Performance Specification ICS-61-SPEC-100, European-Mediterranean Tropospheric Scatter Communication System. It covers one type of voice frequency signaling equipment for use in the System which utilizes tone signals transmitted within the limits of the voice frequency channel. (Author)

AD-430 421 Div. 5
OTS price $2.60

ITT Communication Systems, Inc., Paramus, N. J.
RELIABILITY PRINCIPLES IN COMMUNICATION NETWORKS, by L. S. Schwartz. 29 Sep 61, 26p. Rept. no. ICS 61 TM 6
ESD TDR63 691 Unclassified report

Descriptors: (*Reliability (Electronics), Communication systems), (*Communication systems, Reliability (Electronics)), Air Force, Data transmission systems, Global communication, Systems, Transients, Costs, Measurement, Probability, Feedback, Selection, Networks.

Useful and efficient guides to reliability are needed in order to insure reliable communications in the AIRCOM system. A discussion is presented of factors which influence selection of reliability guides. The following topics are covered: Definition of reliability; Factors which limit or complicate the achievement of reliability; Achievement of reliability; Measurement of reliability; and Criterion of optimization. (Author)

AD-430 461 Div. 5, 30
OTS price $9.10

Melpar, Inc., Falls Church, Va.
SPEECH PROCESSING STUDIES (VOICE DATA PROCESSING SYSTEM).
Final rept., Sep 61-Sep 63,
by H. A. Straight and O. C. King. Oct 63, 115p.
Contract AF19 628 214, Proj. 4610, Task 461002
AFCRL 63 544 Unclassified report

Descriptors: (*Speech compression, Data processing systems), (*Data processing systems, Speech compression), Digital computers, Analog-to-digital converters, Magnetic recording systems, Computers logic, Multiplex, Spectrum analyzers, Digital-to-analog converters, Tables, Programming (Computers), Coding, Bandwidth, Statistical analysis, Statistical data.

This report contains the results of an investigation of speech processing studies. The detailed report is in two parts. Activities of the first period will only be summarized except when it is deemed necessary to include them as prefatory material. The investigation has been responsible for the continued updating of the capability and flexibility of the Voice Data Processing System in an attempt to maintain optimum compatibility between the processor and the research effort for which it was intended. Significant changes which occurred in this final period are the method of recording input amplitude, greater selectivity in pattern coding, expanded keyboard capability, and increased reliability in compiling speech statistics. The appendices include a definition of terms and the system operating instructions. (Author)

AD-430 584 Div. 5
OTS price $1.60

ITT Communication Systems Inc., Paramus, N. J.
ANALYSIS OF AFSK-QFM TEST DATA.
24 Sep 62, 5p. Rept. no. 62 TR103
ESD TDR63 695 Unclassified report

Prepared for special committee 100 radio technical commission for aeronautics.

Descriptors: (*Radio communication systems, Flight testing), (*Radio equipment, Transmissions), Radiofrequency, Effectiveness, Airborne, Surface-to-air, Air-to-surface, Electronic equipment, Tests, Digital systems, Data, Intelligibility, Performance (Engineering), Frequency shift keyers.

Ground-to-air transmissions are superior to air-to-ground transmissions for both quenching frequency modulation (QFM) and automatic frequency shift keyers (AFSK) and for both equipments AN/ARC-65 and AN/ARC-58. Using 95% readability as a criterion, the composite results indicate that QFM percent of message readability is 79% for ground-to-air compared to 68% for air-to-ground. The AFSK percent message readability is 60% for ground-to-air and 45% for air-to-ground. (Author)

AD-430 620 Div. 5, 15
OTS price $1.10

ITT Communication Systems Inc., Paramus, N. J.
FURTHER COMMENTS ON THE RELIABILITY OF NETWORKS, by L. S. Schwartz. 13 Oct 61, 9p. Rept. no. 61TM8
ESD TDR63 692 Unclassified report

Descriptors: (*Communication systems, Networks), (*Networks, Reliability), (*Reliability, Networks), Theory, Redundant components, Mathematical prediction, Feedback, Errors, Probability.

Contents: Introduction; Shannon-Moore Theorem in Terms of Unreliability; Dependent Link Reliabilities in Networks; Reliability of Tandem Configurations With Feedback and Coding.

Division 5 - COMMUNICATIONS

AD-430 621 Div. 5
OTS price $1.60

ITT Communication Systems Inc., Paramus, N. J.
EUR-MED COMMUNICATION SYSTEM GENERAL PERFORMANCE SPECIFICATION.
31 Aug 62, 12p. Rept. no. ICS62SPEC170
Contract AF19 626 4
ESD TDR63 693 Unclassified report

Descriptors: (*Radio communication systems, Specifications), Military facilities, Military requirements, Scattering, Troposphere.

General performance specifications are given for a communications system operating in the Mediterranean Basin. The system provides medium capacity trunk communications linking specified military bases in this area. This specification embraces the system design and performance requirements for the transmission system designated as the European-Mediterranean Tropospheric Scatter Communications System and for the terminal circuits and engineering to be provided at the prescribed military bases. (Author)

AD-430 704 Div. 5, 30, 25, 8, 32
OTS price $4.60

University Coll., London (Gt. Brit.).
(No title).
Progress rept.
July 63, 41p.
Grant AF EOAR62 112
AFCRL 64 86 Unclassified report

Descriptors: (*Speech representation, Spectrum analyzers), (*Speech recognition, Special purpose computers), Speech, Digital recording systems, Communication theory, Pitch discrimination, Noise generators, Language, Computers, Signals, Acoustics, Pulse analyzers, Diodes (Semiconductor), Silicon, Oscillators, Amplifiers, Noise, Sound reproduction systems, Flutter, Hearing, Sound pitch, Sound, Machine translation.

Accounts are given of the following lines of research and instrumentation development projects (1) A study of the formants of the pure vowels of British English; (2) Formant frequencies of Hungarian vowels; (3) An experimental study of the relative contributions of vowel duration and spectral form to the recognition of English and German vowels; (4) Pitch perception and temporal patterning; (5) Long term spectral analysis; (6) SPYL - a combination of an instananeous spectrograph, step synthesizer and a tape loop; (7) Spectrographic assessment of reverberation; (8) Noise generator; (9) Wow and flutter measurement. (Author)

AD-430 812 Div. 5, 12
OTS price $2.60

Boeing Co., Seattle, Wash.
SYSTEM TEST OF THE MINUTEMAN HF RADIO COMMUNICATION SYSTEM,
by C. L. Gies. 6 Nov 63, 24p. Document no. D2 15674 1
Contract AF04 647 289
Unclassified report

Descriptors: (*Radio communication systems, Ground support equipment), (*Ground support equipment, Guided missiles (Surface-to-surface)), High frequency, Tests, Test methods, Performance (Engineering), Test equipment (Electronics), Personnel.

The plan for a system test of the Minuteman HF Radio Communication System is presented. The purpose of this test is to: (a) discover causes of, and find and verify solutions to those problems identified by the Functional Compatibility Test, which require both Boeing and Collins equipment to resolve; (b) to explore and verify that the solutions to these identified problems do not create new problems; (c) to identify and solve any other system problems which may be encountered during this test; (d) to provide assurance that the Minuteman HF Radio Communication System to be installed in Wing 4 will function in accordance with both the specifications and the intent. (Author)

AD-431 197 Div. 5, 8
OTS price $10.50

ITT Communication Systems Inc., Paramus, N. J.
ANTI-JAM TROPOSPHERIC SCATTER THEORETICAL ANALYSIS.
Final rept.
15 June 63, 133p.
Contract AF19 626 5, Task 35
ESD TDR64 218 Unclassified report

Descriptors: (*Radio jamming, Troposphere), radio communication systems, Radar confusion reflectors, Frequency modulation, Scattering, Distortion, Probability, Attenuation, Integral equations.

A theoretical investigation of the effect of radar chaff on the communication performance of tropospheric scatter communication systems using FDM-FM is presented. The characterization of a troposcatter transmission medium with chaff superimposed is discussed. It is shown that the essential information needed to predict the behavior of this composite medium is contained in a certain function sigma (x) called the Scattering Power Distribution. A detailed discussion is presented of the effects of dropping chaff in the common scattering volume of a troposcatter communication system employing FDM-FM. It is shown how the intermodulation distortion can be minimized by leaving out portions of the transmitted baseband spectrum. Analytical results on the intermodulation distortion produced in an FDM-FM system by the frequency selectivity of a general scatter medium (which includes chaff plus atmospheric scatter) are presented. Analytical results on subcarrier phase instability produced in an FDM-FM system by the frequency selectivity of a general scatter medium are presented. (Author)

AD-431 198 Div. 5, 8
OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 6. SPACE COMMUNICATIONS.
Quarterly progress rept., 1 Sep-30 Nov 63.
15 Dec 63, 26p.
Contract AF19 628 500
ESD TDR63 596 Unclassified report

Descriptors: (*Space communication systems, Performance (Engineering)), Satellite antennas, Reflectors, Dipole antennas, X band, K band, C band, Radar antennas, Communication satellites (Passive), Communication satellites (Active), Transistors, Space probes, Communication equipment.

6. DETECTION

AD-429 475 Div. 6, 8, 25
OTS price $2.60

University of Southern Calif., Engineering Center, Los Angeles.
A MODEL FOR THE POWER SPECTRUM OF RETURNED ECHOES FROM A RANDOM COLLECTION OF MOVING SCATTERERS,
by D. G. Childers and I. S. Reed. Dec 63, 18p.
Rept. no. EE102
Contract AF04 695 304, Proj. 3182
SSD TDR63 408 Unclassified report

Report of Detection and Tracking Systems studies and Hypervelocity Impact Problems.

Descriptors: (*Sonar, Noise), (*Radar echo areas, Scattering), (*Noise (Radar), Analysis), Design, Radiofrequency pulses, Radiofrequency power, Probability, Density, Statistical distributions, Correlation techniques, Functions, Models (Simulations).

The time-varying correlation function for a radar (sonar) back-scattered noise process is determined. An approximation is made in order to obtain an expression for the power spectrum of the noise process. The correlation function and the power spectrum are both a function of the probability density that a scatter will be at range r and time t as well as the signal pulse shape. This implies that in order to minimize the noise power the signal may not be wideband but is affected by the probability distribution of the scatterers. (Author)

AD-429 529 Div. 6
OTS price $4.60

Electrical Engineering Research Lab., U. of Texas, Austin.
OBSERVATIONS AT AND NEAR VERTICAL INCIDENCE WITH AN M-33 RADAR,
by A. P. Deam, G. B. Walker and A. H. LaGrone.
30 Nov 63, 1v. SR6 56
Contract AF19 604 8038, Proj. 4603
AFCRL 63 921 Unclassified report

Descriptors: (*Search radar, X-band), (*X-band, Search radar), (*Radar targets, High altitude), Detection, Power, Radar recording cameras, Radar reflections, Atmosphere, Attenuation, Radar interference, Signal-to-noise ratio, Atmospheric refraction, Atmospheric sounding.

The results of a brief observation period with an M-33 X-band radar are reported. Data presented are those obtained by pointing the radar in a fixed vertical position and observing the radar echoes on film and of tracks of invisible airborne targets. This research attempts to set limits of signal strength to be expected at the radar for various atmospheric phenomena and to establish a probability of seeing a particular type return. (Author)

AD-429 821 Div. 6, 2, 30
OTS price $8.60

Laboratory for Atmospheric and Space Physics, U. of Colorado, Boulder.
TRANSISTORIZED RADIOMETERS AND HIGH ALTITUDE RADIATION MEASUREMENTS.
Final rept., Jan 60-Dec 62,
by Robert Parker and Edward P. Todd. 15 Nov 63, 92p.
Contract AF19 604 7240. Proj. 1764, Task 39791
AFCRL 63 911 Unclassified report

Descriptors: (*Radiometers, Transistors), (*Radiation measurement systems, High altitude), Radiation measurement systems components, Solar radiation, Detectors, Scanning, Calibration, Equations, Sensitivity, Satellites, (Artificial).

Three types of electronic-optic equipment packages built for measurement of earth and solar radiation are discribed. One type is a miniature, electronic, bolometer-detector type with either optics-selector turret or optics spatial-scanner head. This type was designed to measure either the albedo of the earth or the self emission of the earth from a satellite. Fourteen of these radiometers were flown on seven satellites. The results of these flights are included in this report. A second type, much bulkier than the first but functionally the same was designed to measure the solar constant from an Aerobee rocket fitted with a biaxial pointing control. This type and the results of the second of two flights is discussed. The third type is an interferometric spectrometer, only one of which has been built. It was intended for use in a sub-orbital rocket flight study of the 6300A oxygen airglow spectral line to determine the intensity and doppler width variation with altitude. A brief description of the instrument is given. (Author)

AD-430 068 Div. 6, 8
OTS price $12.00

IIT Research Inst., Chicago, Ill.
DEVELOPMENT OF IMPROVED HALL EFFECT SENSORS.
Final rept., 1 Oct 60-30 Nov 63,
by Larry J. Greenstein and M. Epstein.
Dec 63, 165p.
Contract NObsr85057, Proj. E146
Unclassified report

Descriptors: (*Magnetometers, Semiconductor devices), (*Semiconductor devices, Hall effect), (*Hall effect, Magnetometers), Gain, Spectrum analyzers, Sensitivity, Magnetic fields, Detection, Probes (Electromagnetic), Weight, Volume, Batteries and components, Indium alloys, Antimony alloys, Ferrites, Signal-to-noise ratio, Portable (Man-portable).

The results of various studies performed on the program were applied to the development of highly sensitive Hall effect probes, and to the incorporation of these probes in the design of a portable, low frequency, magnetic field spectrum analyzer. Several of the subtasks performed on the program resulted in the enhanced capability of magnetic field instrumentation utilizing Hall effect probes. Among the results obtained are (a) the development of a simple technique for achieving predetection magnetic field filtering; (b) the development methods for suppressing carrier frequency components at the outputs of ac-biased Hall sensors; and (c) the optimization of Hall output transformer circuits for dc-biased magnetometers. These results have been utilized in the design of the magnetic field spectrum analyzer, as well as in the development of a three-axis magnetometer. In addition, an investigation has been conducted concerning the possible utilization of magnetoresistive effects in semiconductors, with particular applications to magnetic field detection and true rms metering. The results obtained from the various program subtasks are summarized in this report. (Author)

AD-430 185 Div. 6
OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE ANGULAR RESOLUTION OF MULTIPLE TARGETS,
by J. R. Sklar and F. C. Schweppe. 14 Jan 64, 20p.
Group rept. 64 2
Contract AF19 628 500
ESD TDR64 14 Unclassified report

Descriptors: (*Target discrimination, Mathematical analysis), (*Radar targets, Target discrimination), Resolution, Errors, Detection, Degradation.

The angular accuracy obtainable from an aperture of fixed size is considered, with emphasis on the multiple target case. By means of the Cramer-Rao Inequality, a lower bound to the measurement variance is computed. In addition, the degradation due to uncertainties in the number of targets present is considered. Loss of accuracy is small until the targets approach to within one beamwidth, at which point the degradation becomes severe. (Author)

AD-430 297 Div. 6
OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ERROR ANALYSIS OF A DIGITAL MONOPULSE RADAR,
by M. Schneider and N. T. Gaarder. 30 Jan 64,
17p. Group rept. no. 64 11
Contract AF19 628 500
ESD TDR64 27 Unclassified report

Descriptors: Monopulse radar, Errors), (*Digital systems, Monopulse radar), Analog-to-digital converters, Simulation, Filters (Electromagnetic wave), Radar signals, Radar antennas, Noise (Radar), Radar pulses, Mathematical analysis, Vector analysis, Integral equations, Matrix algebra.

An analysis is presented of the errors introduced into a monopulse radar system by employment of a digital matched filter containing two high speed analog-to-digital converters. The errors predicted by a computer simulation of the system are discussed. The analysis and simulation indicates that a digital monopulse would compare very favorably in performance with an analog monopulse system. (Author)

AD-430 476 Div. 6
OTS price $1.10

Barringer Research, Ltd. (Canada).
AIRBORNE CONCEALED MUNITIONS DETECTOR (INPUT PRINCIPLE).
Monthly progress rept. no. 5, 1-31 Jan 64.
31 Jan 64, 8p.
Contract DA44 009AMC298T
Unclassified report

Descriptors: (*Ordnance locators, Airborne), Electromagnetic shielding, Radio transmitters, Radio receivers, Payload, Towed bodies, Coils.

Work continued on the airborne concealed munition detector. A brief period was spent with the prototype receiver in attempting to establish broad limits on the range of the breadboard system. Having established reasonable range figures for the equipment as it is on the bench, the electronic portions were then positioned within the transmitting coil tube. While it was possible to operate the system when so assembled, it became apparent that the difficulties to be experienced when operating the very low level receiver within the intense transmitting field were somewhat greater than previously estimated. As the range figures (measurable in tens of feet) were encouraging, a beginning has been made on the final breadboard bird with which actual flying tests can be conducted. (Author)

AD-430 785 Div. 6, 8
OTS price $4.60

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF SOUND DAMPING TREATMENT FOR SONAR DOMES.
Progress rept. no. 1,
19 Feb 64, 44p.
Proj S F013 13 01 Task 908
MINS 94 49 Unclassified report

Descriptors: (*Sonar domes, Vibration isolators), Damping, Rubber, Resonance, Signal to noise ratio, Frequency, Rods, Grilles, Sonar receivers, Vibration, Butyl rubber, Polyethylene plastics, Polyester plastics, Polyvinyl chloride, Vulcanizates

The work was primarily directed towards the attenuation of flexural vibrations of the skin and/or reinforcing rods in the dome by applying a damping layer onto the surfaces of these structural members. One compound of polyvinyl chloride-acetate and twelve elastomeric vulcanizates were tested as damping materials. A Hypalon 20 compound was selected as the most promising of these materials. Good dampings were obtained with 1/4 inch and 3/8 in. thick layers of this material bonded to 1/16in. thich steel with epoxy cements. It was found, however, that numerous air pockets were trapped in the cement layers. The air pockets are considered to be objectionable because they might promote sound reflection and/or sound absorption and thus reduce the sound-transparency of the dome. (Author)

7. ELECTRICAL EQUIPMENT

AD-429 357 Div. 7, 9
OTS price $1.60

Chrysler Corp., Huntsville, Ala.
TECHNICAL COMMENT ON THE BEHAVIOR OF ELECTROLYTE IN A WET-CELL ELECTROCHEMICAL BATTERY IN FREE FALL,
by Stephen A. Kallis, Jr. 17 Jan 64, 9p. Rept. no. TN HEE N040
Unclassified report

Descriptors: (*Wet cells, Electrolytes), (*Fluids, Weightlessness), Surface tension, Gases, Bubbles, Batteries & components, Electrochemistry, Surface properties.

In order to determine some of the difficulties to be encountered by electrochemical wet-cell batteries in free fall, a survey was made of the general behavior of liquids in a zero-gravity state. The basic behavior of liquids depends in part upon their wetting characteristics with respect to their containers. The general behavior of wetting and non-wetting liquids in free fall is discussed. The specific application of these behaviors is demonstrated by the discussion of a specific problem to be encountered in wet-cell batteries in free fall. A solution to the problem is presented that utilizes the behavior of liquids in free fall as an integral part of the answer. (Author)

AD-429 503 Div. 7
OTS price $1.75

Radio Corp. of America, Lancaster, Pa.
THE DEVELOPMENT OF A LOW-WORK-FUNCTION COLLECTOR FOR THERMIONIC ENERGY CONVERTERS.
Annual technical summary rept. no. 1, 15 Dec 62-15 Dec 63;
by W. B. Hall and R. J. Hill. 15 Dec 63, 70p.
Contract Nonr4012 00FBM
Unclassified report

Descriptors: (*Thermionic converters, Work functions), (*Work functions, Energy conversion), Electric potential, Single crystals, Tungsten, Molybdenum, Design, Cesium, Thermionic emission, Theory, Vapor pressure, Test equipment (Electronics), Hydrogen, Cesium compounds, High-temperature research, Liquid metals, Vacuum apparatus, Electric power production, Electrons.

The construction and evaluation of a unique device for studying collectors of thermionic converters operating in the Ball-of-Fire mode are described. The test vehicle contains one emitter and a rotating disc on which six collectors are mounted. Without disturbing the vacuum condition, each collector may in turn be brought adjacent to the emitter and the electrode combination can be operated as a converter. The emitter temperature, collector temperature, cesium reservoir temperature, and interelectrode spacing may all be independently varied and measured. Preliminary data for the first set of collectors evaluated in this device are presented indicating that arc-cast tungsten produces the highest power and polycrystaline molybdenum produces the highest voltage at the highest power. (Author)

AD-429 505 Div. 7, 25
OTS price $5.00

Northeastern U., Boston, Mass.
RESEARCH IN ENERGY CONVERSION.
Final rept., 1 July 60-30 Sep 63.
22 Nov 63, 304p.
Contract AF19 604 7358, Proj. 6692, 6694, Task 66924, 66942
AFCRL 63 940 Unclassified report

Descriptors: (*Energy conversion, Scientific research), (*Solar cells, Single crystals), Silicon, Crystal growth, Vapor plating, Photoelectric effect, Photochemistry, Thermoelectricity, Thermionic converters, Plasma physics, Nitrogen compounds, Sulfur compounds, Semiconductors, Organic sulfur compounds, Chelate compounds, Metalorganic compounds, Electrical properties, Electric power production, Space craft, Optical properties.

The research reported may be considered to fall into four broad areas of energy conversion: photovoltaic, thermoelectric, thermionic, and photochemical phenomena. Studies were performed on techniques for fabricating single crystals for solar energy converters, on physico-chemical properties related to semiconduction, on the photochemical properties of selected systems, and on plasma-based devices. (Author)

AD-429 819 Div. 7
OTS price $2.60

Naval Ordnance Lab., Corona, Calif.
CHEMOELECTRIC ENERGY CONVERSION FOR NONAQUEOUS RESERVE BATTERY SYSTEMS.
Quarterly progress rept. no. 2, Oct-Dec 63.
15 Jan 64, 22p.
NAVWEPS 8182 Unclassified report

Descriptors: (*Low temperature batteries, Ammonia), (*Electrolytic cells, Electrochemistry), (*Electrodes, Electrochemistry), (*Thermal batteries, Electrochemistry), Ammonia, Silver compounds, Sulfides, Silver, Eutectics, Resistance (Electricity), Electrolytes, Thiocyanates, Sodium compounds, Reduction (Chemistry), Glass textiles, Materials, Batteries and components, Symposia, Nitrobenzenes.

Research efforts in ionic melt electrochemistry were chiefly concerned with upgrading the data obtained from voltaic cell tests. The principal effort was expended in developing a miniature reference electrode for pill cell environments, to provide the higher quality data that can be obtained in greater quantity by a usable reference electrode. Techniques of chronopotentiometry in beaker cells and in pill cells were applied and monitored with the new reference electrode. Construction methods employing glass paper absorbents were investigated in an effort to reduce the internal resistance of cells. The preparation of materials for another set of factorial experiments (SED 6) was completed. (Author)

AD-430 127 Div. 7, 12
OTS price $3.50

Westinghouse Electric Corp., Lima, Ohio.
SOLAR THERMOELECTRIC GENERATOR SYSTEM CONCEPT AND FEASIBILITY STUDY.
Final rept., Feb 62-Nov 63.
Feb 64, 239p. Rept. no. 64 7E
Contract AF33 657 8089, Proj. 8173, Task 817302 10
RTD TDR63 4248 Unclassified report

Descriptors: (*Thermoelectricity, Generators) (*Power supplies, Solar radiation), (*Solar radiation, Electric power production), Feasibility studies, Lithium compounds, Hydrides, Thermocouples, Model tests, Altitude chambers, Design, Performance (Engineering), Failure (Mechanics), High temperature research, Elec-

tric potential, Electric currents, Resistance (Electrical), Test equipment, Thermal radiation, Optimization, Radiators, Life expectancy, Space propulsion.

The feasibility of combining concentrated solar energy, thermal storage, and a thermoelectric generator as a power supply for space applications has been proven. A nominal 14 watt model, for operation in a 300 mile earth orbit, has been fabricated, tested using electric heat input in an altitude chamber, tested using natural solar energy input in an earth atmosphere and operated on a life test. A 90 minute orbit with 55 minutes of energy input, or sunlight, and 35 minutes of darkness has been simulated. The generator produced constant power (± 7%) for the full 90 minutes. Practical factors obtained from the feasibility model testing have been incorporated into an analytical investigation of a complete system. A power-to-weight ratio of 2.4 is attainable at a power level of 70 watts using a present day 5 foot diameter collector concentrator. The system efficiency (power output from the generator vs. solar energy intercepted) of 4.3% is produced with a thermopile producing 13 watts per pound. Thirty eight (38) per cent of the system weight is provided by the collector concentrator. (Author)

AD-430 128 Div. 7, 25
OTS price $2.60

Dynatech Corp., Cambridge, Mass.
EVALUATION OF A SUPERCONDUCTING ROTATING ELECTRIC GENERATOR.
Quarterly rept. no. 3
by C. J. Oberhauser, E. F. Doyle and R. L. Mela.
Jan 64, 30p. Rept. nos. 451, WRI7
Contract AF33 657 11062, Proj. 8128, Task 812808
Unclassified report

Descriptors: (*Superconductors, Generators), (*Generators, Superconductors), (*Electric power, Superconductors), (*Production), Rotation, Feasibility studies, Tests, Refrigeration systems, Spaceborne, Magnetic fields, Test equipment (Electronics), Solenoids, Temperature, Electromagnets.

Research was continued on a program to determine the feasibility of the application of superconductor technology to the generation of electrical power by rotating electromagnetic devices. Since the anticipated use of such a generator is for long missions, a refrigerator with associated equipment must be part of the package. The work includes analytical and design studies of both electrical and mechanical components. The program may be divided into three parts: initial design study, supporting tests, and second-round design. Results of supporting tests and initial second-round design are discussed. (Author)

AD-430 220 Div. 7
OTS price $5.60

Westinghouse Electric Corp., Lima, Ohio.
DEVELOPMENT OF HIGH TEMPERATURE ALKALI METAL RESISTANT INSULATED WIRE.
Quarterly progress rept. no. 4, 15 Nov 63-15 Feb 64,
by E. S. Bober, W. H. Snavely and R. E. Stapleton. 15 Feb 64, 57p.
Contract AF33 657 10701, Proj. 8128, Task 8128 08
Unclassified report

Descriptors: (*Electric wire, Electrical conductance), (*Alkali metals, Vapors), Potassium, Mercury, High-temperature research, Nickel, Silver, Aluminum compounds, Electrical properties, Electric insulation, Nitrides, Vapor plating, Oxides, Zirconium compounds, Thorium compounds, Magnesium compounds, Strontium compounds, Beryllium compounds, Flame spraying, Plasma jets, Environmental tests, Ceramic coatings.

This report covers effort directed toward the development of an insulated electrical conductor resistant to saturated potassium (850 C) and mercury (538 C) vapors. Thirty-three samples were exposed to potassium vapor at 850 C. Six samples were exposed to mercury vapor at 540 C. Preformed coils of nickel clad silver were coated with molybdenum and nickel aluminide respectively by plasma-arc spraying techniques. These coils were then insulated by plasma-arc sprayed coatings of zirconia (99%), followed by high purity alumina (98%). Vibration, shock, acceleration, and humidity tests were conducted on these insulation combinations in a statorette. These tests were successfully passed by the insulated wire. An attempt was made to measure the leakage resistance of a sapphire to tantalum seal while the seal was exposed to potassium vapor at 850 C. This attempt was partially successful. The results of this test indicate potassium vapor at 850 C will not act as a conductor. (Author)

AD-430 243 Div. 7, 17
OTS price $1.60

Whirlpool Corp., St. Joseph, Mich.
THERMOELECTRIC JUNCTIONING PROJECT.
Progress rept. no. 6, 1 July-30 Sep 63,
by James E. Robinson. 31 Oct 63, 16p.
Contract NObs86483, Proj. SR007 12 01, Task 806
Unclassified report

Descriptors: (*Thermoelectricity, Thermocouples), (*X-ray spectroscopy, Thermoelectricity), (*Thermocouples, Physical properties), Plating, Chemical analysis, Bismuth alloys, Tellurium alloys, Soldering alloys, Antimony alloys, Electrodes.

An investigation is presented of the feasibility of using x-ray fluorescent analysis to determine diffusion characteristics of junctions. Also investigated was the effect of applying barrier films to the thermoelectric materials by electrolytic plating and multielectrode sputtering. A system of physical measurements was initiated and checked to determine a comparison and quality control of the various methods used in preparing thermoelectric couples. (Author)

AD-430 251 Div. 7
OTS price $6.60

Ion Physics Corp., Burlington, Mass.
ELECTROSTATIC POWER GENERATOR.
Quarterly technical progress rept. no. 1,
15 Oct 63-15 Jan 64,
comp. by F. J. McCoy, M. Thayer, J. Edick, J. E. Lavelle, and W. Courtney. 31 Jan 64, 66p.
Contract AF33 615 1168, Proj. 8128,
Task 8128 08
Unclassified report

Descriptors: (*Electrostatic generators, Power equipment), Electric insulation, Field emission, Electrodes, Vacuum, Electric discharges, Surface properties, Anodes, Cathodes, Polishes, Metal coatings, Dielectrics, Coatings, Pressure, Grain structures (Metallurgy), Hardness, Pulse generators, Transformers, Vaccum seals, Effectiveness, Equations.

Contents: Vacuum Insulation -- General, Studies

on Surface Finish Effect, Studies on Material-Polarity Effects, Pure Metal Electrodes and Pure metal Coatings, Non-Conducting Coatings on the Cathode, Large Area Studies, Pressure Effects, Surface Hardness Effects, Grain Size and Orientation Effects, Single Breakdown-No Breakdown Tests; Conditioning Experiments; Field Emission Studies; Exciter Transformer; High Vacuum Rotary Seal -- Introduction, Problem, Approach, Vacuum System Design, Shaft Sealing Efficacy, Seal Surface Preparation, Electrostatic Generator Shaft Seal Design.

AD-430 404 Div. 7
OTS price $1.75

Mallory, P. R. and Co., Indianapolis, Ind.
MERCURY CELL BATTERY INVESTIGATION.
Final rept., 16 Dec 62-15 Dec63.
Feb 64, 68p.
Contract AF33 657 7706, Proj. 8173, Task 817304 14
RTD APL TDR64 15 Unclassified report

Descriptors: (*Alkaline cells, Mercury), (*Batteries and components, Alkaline cells), (*Power supplies, Aerospace craft), Mercury alloys, Palladium alloys, Zinc, Mercury compounds, Oxides, Potassium compounds, Hydroxides, Electrodes, Ethylene oxide, Polymers, Anodes (Electrolytic cell), X-ray diffraction analysis, Particle size, Distribution, Electrochemistry, Capacitance, Silver alloys, Surface area, Cathodes (Electrolytic cell), Binders, Polyvinyl alcohol, Porous materials, Manufacturing methods, Battery separators, Silver.

An investigation of rechargeable modifications of the electrochemical system zinc/potassium hydroxide/mercuric oxide has been conducted from the viewpoint of aerospace requirements. Preliminary design criteria were established for a battery capable of 20-amp. discharge rates. Physical characteristics of the zinc negative electrode were improved by adding an organic binder. Simultaneous evaluation of zinc electrodes without influence from positive electrodes was employed during negative electrode investigations. Applicability of a-c impedance type capacitance measurements to determine surface area of porous electrodes was studied, but the method was of limited value. Mercury-palladium alloys as positive electrode materials demonstrated rechargeability with adequate voltage regulation on discharge. X-ray diffraction and particle size distribution studies were used to determine characteristics of the alloy material. Cells of multiple parallel electrode design were constructed and cycle tested. (Author)

AD-430 486 Div. 7
OTS price $4.60

ITT-Surprenant Mfg. Co., Clinton, Mass.
DEVELOPMENT OF FIELD DATA CABLE.
Quarterly progress rept. no. 1, 28 June-30 Sep 63, by H. L. Pibus. 30 Sep 63, 44p.
Contract DA36 039AMC03337E
Unclassified report

Descriptors: (*Coaxial cables, Design), (*Pulse cables, Coaxial cables), Electrical impedance, Metal coatings, Silver, Mechanical properties, Polyethylene plastics, Expanded plastics, Attenuation, Tests, Test methods, Copper alloys.

Test and development were aimed toward an improved Field Data cable. Methods to reduce cable size and weight while increasing electrical and mechanical reliability. Existing Field Data cable has been evaluated electrically and mechanical ly. Several coaxial cable constructions have been built and evaluated to determine the effects of cable dimensions, conductor size, type and impedance on pulse transmission. The use of Litz conductors at these pulse frequencies does not greatly improve pulse transmission conditions. Testing has been completed on 70 ohm cables. These data indicate that seven strands of Alloy 63 with a silver plate will provide an optimum cable component at this time. A cable of this construction would improve the field data cable mechanically by approximately 1000 per cent. (Author)

AD-430 538 Div. 7
OTS price $1.60

Melpar, Inc., Falls Church, Va.
A THIN-PLATE BATTERY.
Supplement to final summary rept. 16 Feb 61-15 Nov 63,
by J. Smit, H. H. Titus, and R. T. Foley.
15 Nov 63, 13p.
Contract NOw60 0362C
Unclassified report

Report on Molecular Circuit Development.

Descriptors: (*Primary cells, Ammonia), (*Low temperature batteries, Ammonia), (*Electrolytic cells, Ammonia), Benzene, Nitrates, Ammonium compounds, Organic sulfur compounds, Potassium compounds, Magnesium, Electrolytes, Electrodes, Design, Encapsulation, Nitrobenzenes, Thiocyanates.

Initial investigations utilized the single cell as the test vehicle. Tests, with a few exceptions, were conducted on either the Mg/KCNS in NH3/m-DNB+C or Mg/NH4SCN in NH3/mDNB+C system. Cell performance was affected grossly by component-fabrication procedures. Volatilization of m-DNB is directly related to these procedures and is a leading factor in performance degradation. Other factors of significance are current density, electrolytic solution concentration, and cell thickness and weight. A pronounced change in cell performance was obtained through the salt selection in the electrolytic solution. Preliminary studies of fixture-tested, multiple-cell units revealed an electrolytic solution feeding problem which was overcome by increased intercell spacing and grooving. Several packaging and component-fabrication techniques applicable to encapsulated unit production were evaluated. (Author)

AD-430 561 Div. 7, 17, 25
OTS price $3.60

New York Univ., N. Y. Coll. of Engineering.
RESEARCH IN THERMOELECTRIC MATERIALS,
by A. Machonis, E. Pan, and I. Cadoff. Aug 63, 40p.
Contract Nobs86364
Unclassified report

Descriptors: (*Thermoelectricity, Materials), (*Alloys, Single crystals), Lead alloys, Tin alloys, Tellurium alloys, Tellurides, Barium alloys, Barium compounds, Lead compounds, Solid solutions, Semiconductors, Measurement, Resistance (Electrical), Hall effect, Thermal conductivity, Electrical conductance, Temperature.

The electronic properties of single crystals of alloys of PbTe and SnTe in various ratios between the two limits are being studied. PbTe and SnTe are isomorphous and form a continuous series of

solid solutions. The carrier sign of PbTe can be changed from 'n' type for excess Pb to 'p' type for excess Te. SnTe is 'p' type and extrinsic for all stoichiometric ratios. When more than 15% SnTe is alloyed with PbTe the alloys become 'p' type. The average carrier concentration as determined from Hall effect in general increased with increasing SnTe and was also found to be sensitive to changes in the composition range of stability of the compound (retrograde solubility etc.). (Author)

AD-430 588 Div. 7
OTS price $2.60

Delco-Remy Div., General Motors Corp., Anderson, Ind.
APPLIED RESEARCH INVESTIGATION OF SEALED SILVER-ZINC BATTERIES.
Quarterly technical progress rept. no. 3, 1 Nov 63-1 Feb 64.
14 Feb 64, 29p.
Contract AF33 657 10643, Proj. 8173, Task 817304 21
Unclassified report

Descriptors: (*Storage batteries, Materials), (*Battery separators, Storage batteries), (*Electrolytic cells, Storage batteries), Electrodes, Electrolytes, Films, Acrylonitrile polymers, Polyethylene plastics, Halocarbon plastics, Membranes, Zinc, Silver compounds, Oxides, Potassium compounds, Hydroxides, Sodium compounds, Lithium compounds, Life expectancy.

Tests designed to show effects of separator overhang continued with both positive and negative plates reduced in area to obtain sufficient separator overhang. Cells containing various combinations of acrylonitrile type separations wrapped around negatives did not show any significant improvement in cycle life as compared to control cells. Cells containing NaOH electrolytes completed over 1500 cycles before failure. Experimental results of tests made on some potential electrolyte materials are reported. Evaluation tests on sample separator materials are nearly completed, and pilot run materials are on order. (Author)

AD-430 693 Div. 7
OTS price $3.00

Naval Research Lab., Washington, D. C.
DIRECT ENERGY CONVERSION LITERATURE ABSTRACTS.
Dec 63, 156p.
Unclassified report

Descriptors: (*Bibliographies, Energy conversion), (*Energy conversion, Bibliographies), (*Power supplies, Abstracts), (*Electric power production, Bibliographies), Thermoelectricity, Thermionic emission, Magnetohydrodynamics, Fuel cells, Energy, Photoelectric cells (Semiconductor), Electrochemistry, Batteries and components, Thermionic converters, Nuclear energy.

This is the sixth in a series of bibliographies covering unclassified literature related to the direct conversion of energy. Subject coverage includes thermoelectricity, thermionic emission, photoelectric processes, magnetohydrodynamics, electrochemical processes, energy storage, and energy sources. (Author)

AD-430 802 Div. 7
OTS price $4.60

Union Carbide Consumer Products Co., Parma, Ohio.
THIN FUEL CELL ELECTRODES.
Quarterly rept. no. 2, 1 Sep-1 Dec 63,
by K. V. Kordesch. 1 Dec 63, 47p.
Contract DA36 039AMC02314E, Task 1G6 22001A053 04
Unclassified report

Descriptors: (*Electrodes, Fuel cells), (*Fuel cells, Electrodes), Test equipment, Tests, Environmental tests, Nickel, Carbon, Hydrogen, Gases, Oxygen, Nitrogen, Air, Factor analysis, Electrolytes.

Effect of gas composition changes, temperature increase, and variation of caustic concentration were determined, in turn leading to a better understanding of the composite mechanism of gas electrode operation. The collection of data on materials' properties has been continued with more work devoted to carbon powders. Three different metal backings have already been found suitable for thin electrodes. The program for factorial testing is set up and all electrodes needed for the program are manufactured; however, preliminary testing of small cells on a large scale was hampered with such troubles as faulty temperature control, poor electrolyte equilibration, and uncertain gas feed. Step-by-step, these difficulties have been eliminated so that we are now assured of conclusive factorial testing. A technique of mounting electrodes in polyethylene eliminated earlier difficulties with cast epoxy frames and gaskets. Long-time testing of larger cells and modules is progressing satisfactorily and will be continued with more emphasis on air operation at high and low relative humidity, at freezing temperatures, with and without carbon dioxide. (Author)

AD-430 864 Div. 7, 1
OTS price $1.10

Naval Ammunition Depot, Crane, Ind.
QUALIFICATION TEST OF FIVE AIRCRAFT BATTERIES, LEAD ACID, TYPE MS25211-2, MANUFACTURED BY GILL ELECTRIC MANUFACTURING CORPORATION.
12 Feb 64, 8p.
NAD CI QE66 Unclassified report

Descriptors: (*Aircraft equipment, Storage batteries), (*Storage batteries, Aircraft equipment), (*Batteries and components, Military requirements), Lead, Performance (Engineering), Environmental tests, Electrolytes, Tests, Altitude chambers, Shock (Mechanics), Vibration, Thermal stresses, Acids.

Qualification tests were conducted on five batteries Type MS25211-2, 12 cell, 24 volt, lead acid aircraft storage battery having a rated capacity of 20 ampere-hours at the 2-hour rate. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-429 358 Div. 8, 12, 20
OTS price $1.60

Naval Ordnance Lab., Corona, Calif.
TRANSIENT RADIATION EFFECTS ON ELECTRONICS.
Interim rept.,
by J. L. Hill. 1 Jan 64, 14p.
NAVWEPS 8177 Unclassified report

Descriptors: (*Diodes (Semiconductor), Radiation damage), Firing circuits, Electronic switches, Crystal rectifiers, Dose rate, Hardening, Gamma rays, Test methods, Tests.

Certain missile electronic circuits using Shockley diodes, silicon-controlled switches, and silicon-controlled rectifiers were irradiated to determine the threshold dose rates for transient effects and to evaluate hardening techniques. This effort has resulted in the design of firing circuits that cannot be initiated by available test levels of gamma radiation. (Author)

AD-429 371 Div. 8, 25
OTS price $1.60

Institute for Defense Analyses, Washington, D. C.
GROUP VELOCITY IN A DISPERSIVE MEDIUM,
by J. Menkes. Dec 63, 8p. Research Paper P-96;
IDA HQ63 2134
Contract SD50
Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), Absorption, Attenuation, Linear systems, Functions, Complex variables, Frequency, Transformations (Mathematics), Refractive index, Velocity, Sound.

AD-429 384 Div. 8
OTS price $2.60

Westinghouse Defense and Space Center, Baltimore, Md.
STUDY OF FABRICATION OF MICROELECTRONIC ASSEMBLIES FOR FREQUENCY AND TIME CONTROL SYSTEMS.
Interim development rept. no. 2, 1 Oct-31 Dec 63.
31 Dec 63, 18p. Rept. no. TPE5744
Contract NObsr87593, Proj. SR0080303, Task 9624
Unclassified report

Report on Phase II - A Feasibility Model of a Microminiature VLF/LF Frequency Synthesizer.

Descriptors: (*Frequency converters, Microminiaturization (Electronics)), Very low frequency, Low frequency, Design, Tuned circuits, Mixers (Electronic), Gates (Circuits), Amplifiers, Crystal filters, Semiconducting films.

Efforts were made to design and build a VLF/LF frequency synthesizer in microelectronic form. A complete, single thread breadboard of this system was built and operated with a spurious content 60 db below signal level. Refinements may be expected to reduce the spurious content to 80 db below signal level. Approximately 40% of the thin film wafers were fabricated. A portion of these were tested and are awaiting encapsulation. (Author)

AD-429 385 Div. 8, 26
OTS price $3.60

Westinghouse Defense Center, Baltimore, Md.
STUDY OF MICROCIRCUITRY TECHNIQUES UTILIZING MOLECULAR ENGINEERING.
Interim rept. no. 10, 20 Sep-20 Dec 63.
20 Dec 63, 24p.
Contract NObsr81380, Proj. SR0080302
Unclassified report

Descriptors: (*Microminiaturization (Electronics, Molecular electronics), (*Pulse amplifiers, Molecular electronics), (*Molecular electronics, Microminiaturization (Electronics)), Production, Manufacturing methods, Resistors, Magnetic fields, Temperature, Performance (Engineering), Power, Sandwich construction, Diodes (Semiconductor), Electric terminals, Containers, Packaged circuits.

The object of this program extension is the design and construction of 16 pulse amplifiers which are to be packaged at a density of 16 amplifiers per linear inch. This report includes discussions of design considerations of the semiconductor devices, fabrication techniques, test evaluations, packaging alternatives, and their corresponding thermal analyses. The amplifier can be constructed with either a high-power linear load resistor or a non-linear field effect resistor. A considerable reduction in power dissipation is achieved by using the field effect resistor. Operation of the circuit using the field effect resistor is thoroughly discussed. (Author)

AD-429 387 Div. 8, 14
OTS price $5.60

Brunswick Corp., Marion, Va.
DEVELOPMENT OF A 1200 F RADOME.
Interim engineering rept. no. 3, 1 Oct-31 Dec 63,
by V. A. Chase and R. L. Copeland. 31 Dec 63,
51p.
Contract AF33 657 11469, Proj. 4161, Task 416102
Unclassified report

Descriptors: (*Radomes, Materials), (*Radar equipment, Radomes), (*Reinforcing materials, Radomes), Glass textiles, Mechanical properties, Laminates, Aluminum compounds, Phosphates, Sealing compounds, High-temperature research, Tensile properties, Deformation, Aging (Materials), Reflection, Thermal expansion, Physical properties, Compressive properties, Dielectric properties, Electrical properties, Moisture, Absorption (Physical), Composite materials, Bonding.

Work covered includes investigation of the effects of different fabric weaves on the strength properties of glass reinforced aluminum phosphate laminates at elevated temperatures. Thermal, mechanical and electrical properties of aluminum phosphate laminates were measured. Radar transmission and power reflection coefficients were measured on a laminate at 10.0 kmc for different angles of incidence. High temperature sealants for the radome surface were evaluated and the effect of thermal expansion differences between the matrix and reinforcement were studied. The most promising reinforcement found was Owens Corning S-994 glass woven into a 143 Style fabric. Average flexural strengths for five specimens at room temperature and 1100 F were measured to be 20,800 and 24,100 psi with this reinforcement. A discussion of problem areas involving loss of tensile strength at elevated temperatures and loss of flexural strengths after aging at elevated temperatures is presented. Theory as to causes for this strength loss and possible corrective action is discussed. (Author)

AD-429 421 Div. 8
OTS price $5.60

Naval Postgraduate School, Monterey, Calif.
TRANSISTOR ELECTRONICS,
by Abraham Sheingold. Apr 63, 52p.
NPS RP35 Unclassified report

Descriptors: (*Transistor amplifiers, Circuits), (*Semiconductor devices, Design), Resistance (Electrical), Stability, Diffusion.

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-429 437 Div. 8, 26
OTS price $2.60

Hi-Q Div., Aerovox Corp., Olean, N. Y.
PRODUCTION ENGINEERING MEASURE FOR ROLLED CERAMIC CAPACITORS.
Quarterly rept. no. 10, 9 Sep-9 Dec 63,
by M. J. Shoemaker. 9 Dec 63, 23p.
Contract DA36 039sc85963
Unclassified report

Descriptors: (*Ceramic capacitors, Manufacturing methods), (*Manufacturing methods, Ceramic capacitors), Fixed capacitors, Test equipment, Dielectrics, Production, Dielectric properties, Photographs.

Some minor modifications were made to the electroding equipment, the winding equipment and the terminating machine. Short runs were first made with the equipment for calibration and adjustment. The ceramic tape required for the pilot run was made in a series of runs on the sheet forming machine. Sample units were made from each run to test the electrical and physical properties of the tape as a matter of control The pilot run was started. (Author)

AD-429 439 Div. 8
OTS price $5.60

Eon Corp., Brooklyn, N. Y.
SPECTRAL RESPONSE STUDY OF AERIAL SURVEY METER.
Final rept.
Dec 63, 47p.
Contract OCD OS63 51
Unclassified report

Descriptors: (*Radiation measurement systems, Detectors), (*Detectors, Calibration), (*Ionization gages, Detectors), Gamma rays, Airborne, X-rays, Life expectancy, Stability, Aluminum, Shielding, Time, Cesium, Measuring devices (Electrical & electronic).

This report presents the results of a spectral response study and calibration of the aerial survey meter over the energy range 80 kev to 1.2 mev. The meter utilizes three separate detectors to provide three ranges (0.1 r/hr, 1 r/hr and 10 r/hr). Each of these detectors was successfully corrected for spectral response to within the required plus or minus 10%. Drawings and specifications for each detector shield were developed. It seems feasible to have these detectors supplied with ''built-in'' spectral correction for ASM application. Unexpected difficulty was encountered in this task because many of the detectors proved to be unstable in operation as a function of time. This is a serious situation and may result in dangerous inaccuracy of measured results. It is recommended that the tube specifications be revised to include active and shelf life requirements; that stability sampling tests be performed on all detectors prior to initial installation in aerial survey meters; that the test circuitry be made to reflect the actual mode of operation in the equipment; and that the stringent shock and vibration requirements (which now appear in the equipment specification) be made a part of the detector specifications to prevent acceptance of mechanically fragile detectors. (Author)

AD-429 472 Div. 8
OTS price $3.60

Warnecke Electron Tubes, Inc., Des Plaines, Ill.
STUDY OF INTERACTION STRUCTURES LEADING TO DEVELOPMENT OF X-BAND CROSSED-FIELD AMPLIFIER,
Quarterly progress rept. no. 2, 28 Sep-28 Dec 63.
28 Dec 63, 33p.
Contract NObsr89504, Proj. SF0100201, Task 9294
Unclassified report

Descriptors: (*Microwave amplifiers, X-band), (*Delay lines, Microwave amplifiers), (*X-band, Microwave amplifiers), Heat, Sapphires, Attenuation, Aluminates, Brazing, Copper.

Continuing progress toward development of a 2 kilowatt CW crossed-field amplifier in X-band, the following studies were made during the second quarter of this project. (1) Study of the attenuation characteristics of a meander line mounted on ceramic; (2) Cold measurements on full-scale lines in S-band; (3) Study of appropriate ceramics for use in X-band lines. Since the X-band lines will possess extremely small dimensions, the surface state of the ceramic will play an important part in the circuit precision achievable. At the present time sapphire has emerged as the most promising ceramic for X-band use. Studies to determine the suitability of sapphire, from the heat conductivity standpoint, have shown that it should be possible to dissipate the excess heat with a structure of the size envisioned for the tube; (4) Study of the technology for producing ceramic delay lines; (5) Measurement of the heat conductivity of a metal-ceramic sandwich. (Author)

AD-429 510 Div. 8
OTS price $2.60

American Electronics Labs., Inc., Colmar, Pa.
ATC RADAR BEACON SLS CRYSTAL DIODE SWITCH.
Final rept.
30 Sep 63, 17p.
Contract ARDS464, Proj. 108 2D
Unclassified report

Descriptors: (*Radar beacons, Electronic switches), (*Radar antennas, Electron switches), (*Electronic switches, Radar antennas), Crystal rectifiers, Omnidirectional antennas, Transistors, Switching circuits, Antenna feeds, Test methods, Tests, Performance (Engineering), Antenna lobes, Air traffic control systems, Airport radar systems.

The development of a crystal diode microwave switch with coaxial input and output connectors is described. The switch was designed for alternately switching the RF output pulses of an ATC Radar Beacon System transmitter from a rotating directional antenna to an omnidirectional antenna. The switch is a fast-acting solid-state switch that has relatively high power handling capability, low insertion loss and high isolation between the output channels. The solid-state switch driver is also described. The switch meets all design specifications. Field replacement of crystal diodes is not recommended in the model delivered but should be a design goal for future production model switches. The acceptance test procedure and test results are included. (Author)

AD-429 516 Div. 8, 25
OTS price $2.60

General Electric Co., Schenectady, N. Y.
MILLIMETER WAVE GENERATION BY PLASMA.
Interim engineering rept. no. 2, 30 Sep-31 Dec 63.
31 Dec 63, 25p.
Contract Nobsr89507, Proj. SR008 03 01
Unclassified report

Descriptors: (*Plasma medium, Millimeter waves), (*Millimeter waves, Plasma medium), Electron beams, Confinement, Contamination,

Electrons, Injectors, Circuits, Timing devices, Magnets, Plasma physics, Electron guns, Timing circuits.

This second engineering report describes in more detail the components of the millimeter wave generation experiment. No major changes have been made in the design of the experiment or the approach since the previous engineering report, although refinements and simplfications have been made. These refinements have reduced the cost of the experiment and increased the probability of early success in assessing the conversion phenomena. The experimental tube is now a single section, sealed off, gettered unit containing a Pierce type electron injector, a 9 Gc four turn resonant helix, a single, cold cathode PIG plasma generator, a TM01 microwave pipe radiator and a mercury appendage. PIG discharge and plasma compression occurs simultaneously in a period of 300-500 microseconds. Conversion effects are monitored throughout the compression and decaying cycle of the magnetic field. (Author)

AD-429 525 Div: 8, 7, 26
OTS price $1.60

Erie Technological Products, Inc., Pa.
PRODUCTION ENGINEERING MEASURE FOR RESISTOR-CAPACITOR MICROELEMENTS FOR MICROMODULES.
Quarterly rept. no. 2, 28 Sep-27 Dec 63,
by J. E. Schupp. 27 Dec 63, 14p.
Contract DA36 039AMC01479E
Unclassified report

Descriptors: (*Capacitors, Production), (*Resistors, Production), (*Manufacturing methods, Production), Jigs, Modules (Electronic), Microminiaturization (Electronics), Life expectancy, Performance (Engineering), Resistance, Capacitance, Temperature.

Presented is a brief description of the major accomplishments in the resistor-capacitor microelement project. Status of Program: Reports were submitted per contract requirements. Manufacture of resistor-capacitor microelements was started. Material necessary to manufacture the pre-production samples has been received. Design and fabrication of special tooling is continuing. Sample resistors and capacitors were printed for testing evaluation. (Author)

AD-429 536 Div. 8
OTS price $8.10

Cornell U., School of Electrical Engineering, Ithaca, N. Y.
THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF LINEAR-BEAM MICROWAVE TUBES. VOLUME II.
Final rept.
Dec 63, 1v.
Contract AF30 602 2573, Proj. 5573, Task 557303
RADC TDR63 518, vol. 2 Unclassified report

Descriptors: (*Klystrons, L-band), (*L-band, Microwave amplifiers), (*Microwave amplifiers, Klystrons), Power, Cavity resonators, Bandwidth, Temperature, Electric potential, Magnetic fields, Mathematical analysis, Performance (Engineering).

Contents: Experimental Investigation of an Extended-Interaction Ring-Rod Resonator, by R. P. Zimmer. 18 Oct 63. (RR EE 577); A study of the PI Mode of the Doubly Re-Entrant Klyistron Cavity, by J. E. Goell. 30 June 63 (RR EE 563)

AD-429 542 Div. 8
OTS price $3.60

Photocircuits Corp., Glen Cove, N. Y.
PRODUCTION ENGINEERING MEASURE FOR MULTILAYER PRINTED WIRING BOARD.
Quarterly rept. no. 3, 1 Jan-31 Mar 63,
by G. Messner, R. McCaw and M. Paluszek.
31 Mar 63, 1v.
Contract DA36 039sc86745
Unclassified report

Descriptors: (*Printed circuits, Production), (*Subminiature electronic equipment, Manufacturing method), Soldering, Laminates, Plating, Photoengraving, Jigs, Templates, Drills, Quality control, Adhesives, Test equipment (Electronic), Epoxy plastics, Glass textiles.

An investigation of solder fillet formation methods on individual layers, as well as some other processes, was carried out and some alternate methods of manufacture were developed. The process standards and production rates for the majority of manufacturing steps have been issued. Overall production capacity and manpower requirements have been evaluated for a continuous production rate of 60 six-layered printed wiring boards per 8-hour shift using the clearance hole method of construction. Various design approaches for the most versatile and economical special tooling suitable for the high production rate of different board configurations. (Author)

AD-429 721 Div. 8, 25
OTS price $7.60

Florida U., Engineering and Industrial Experiment Station, Gainesville.
A THEORY OF QUANTUM COMMUNICATIONS,
by John B. O'Neal, Jr. 5 Dec 63, 66p. Rept. no. SR2
Contract AF19 628 431, Proj. 5632, Task 563204
AFCRL 64 3 Unclassified report

Descriptors: (*Communication theory, Quantum mechanics), (*Quantum mechanics, Communication theory), Communication systems, Mathematical models, Functions, Operators (Mathematics), Signals.

A model for a bandlimited quantum communications channel and the channel capacity of such a channel in the absence of external and thermal noise are investigated. The channel capacity of a quantum channel is affected by quantization in two important ways. The mere fact of quantization itself, i.e., that a quantized signal is restricted to a finite number of states which it can assume, limits the ability of the signal to contain information. The other factor which degrades the performance of a channel is that every bandlimited signal contains an irreducible uncertainty which is due to the uncertainty principle. This report represents an attempt to construct a reasonable model which takes these two factors into consideration. (Author)

AD-429 724 Div. 8
OTS price $10.10

Airborne Instruments Lab., Inc., Deer Park, N. Y.
ON SOLID-STATE CIRCUITS.
Final rept.,
by S. Hamilton, W. W. Heinz, S. Okwit, E. W. Sard and K. Siegel. Oct 63, 1v. Rept. no. 1654 1
Contract AF30 602 2699, Proj. 4506, Task 450602
RADC TDR63 521 Unclassified report

Descriptors: (*Limiters, Radio receivers), (*Parametric amplifiers, Broadband), (*Waveguide circulators, Ferrites), Broadband, Power, Life expectancy, Noise (Radio), C band, Linear systems, Diodes (Semiconductor), Standing wave ratios, Signal-to-noise ratio, Electrical properties.

Results are presented of a study program to advance the state of the art in UHF limiters, octave-band ferrite circulators, and low-noise receivers having linear phase response suitable for pulse-compression applications. Two practical varactor limiters were developed -- a broad-band configuration (octave range) using a PN diode, and a low threshold ultra-dynamic range configuration. The broad-band limiter was successfully tested at high pulse powers using a 1-megawatt radar. Its burnout energy was in excess of 87,000 ergs, provided 30 db of protection, had a recovery time of 0.5 micrn/econds, and did not exhibit any spike leakage. The low-threshold limiter had a limiting level of less than -20 dbm, an insertion loss of less than 2 db, and a dynamic range of about 70 db. A comprehensive theoretical and experimental technique was developed that was applied to the design and development of octave-wide Y-junction ferrite circulators. These circulators had isolations of greater than 20 db, SWR's of less than 1.4, and insertion losses of about 0.5 db over the complete octave range. (Author)

AD-429 728 Div. 8, 12
OTS price $9.10

Boeing Co., Seattle, Wash.
ELECTRO-INTERFERENCE TEST PLAN FOR THE WS-133A SYSTEM - STP-III COMPLEX, H AND D,
by J. W. Trumbo. 14 Mar 62, 174p. Document no. D2 7845
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missile components, Radiofrequency interference), Guided missiles (Surface-to-surface), Tests, Test methods, Simulation, Reliability, Monitors, Communication systems, Explosives initiators, Compatibility, Specifications, Instrumentation, Electrical equipment, Ground support equipment, Launching sites, Transients, Safety.

The objectives of the tests described in this document are; 1. Determine that electro-interference safety margins exist in critical diphase and digital logic circuitry, and that all system performance monitors indicate normal system operation; 2. Determine that an adequate safety margin exists in order that ordnance devices will not be subjected to hazardous currents due to electro-interference; 3. Determine that electro-interference in communications subsystems circuitry will not degrade the performance of these subsystems; 4. Verify that electro-interference instrumentation and test procedures that have been developed for WS-133A compliance tests are applicable to the weapon system testing.

AD-429 729 Div. 8, 12
OTS price $22.25

Boeing Co., Seattle, Wash.
EQUIPMENT ELECTRO-INTERFERENCE TEST PLAN,
by Gene P. Tinney and F. A. Beaushamp. 1 Sep 62, 1v. Rept. no. D2 6181
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Radiofrequency interference), Test equipment, Test methods, Checkout equipment.

AD-429 790 Div. 8, 26
OTS price $2.60

General Electric Co., Owensboro, Ky.
C-BAND TRIODE-CAVITY OSCILLATORS, PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 2, 13 Aug 62-30 Nov 63,
by J. D. Marshall. 30 Nov 63, 24p.
Contract DA36 039AMC01474E
Unclassified report

Descriptors: (*Triodes, Cavity resonators), (*Microwave oscillators, Triodes), Test equipment (Electronics), Production, C band, Tests, Environmental tests, Electron tube heaters, Frequency shift, Scheduling.

Efforts were directed toward production improvements on C-band triode-cavity oscillators. Pulse and CW cavity oscillators were assembled for the first engineering sample. Representative life tests have been completed. Operating characteristics of cavities are summarized. Modifications in triode design are being studied. (Author)

AD-429 793 Div. 8
OTS price $13.50

Cornell U., School of Electrical Engineering, Ithaca, N. Y.
THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF LINEAR-BEAM MICROWAVE TUBES, VOLUME I.
Final rept.
Dec 63, 187p. RR EE575, Vol.1
Contract AF30 602 2573, Proj. 5573, Task 557303
RADC TDR63 518, vol.1 Unclassified report

Descriptors: (*Electron tubes, Microwave frequency), (*Electron beams, Microwave amplifiers), Traveling wave tubes, Klystrons, Noise (Radio), Focusing, Modulation, Electron guns, Radiofrequency pulse, Resonators.

The work accomplished in the School of Electrical Engineering at Cornell University entitled Experimental and Analytical Investigation of Linear-Beam Microwave Tubes is decribed. The broad objective of this program was to investigate, both experimentally and analytically, those factors which limit the performance of linear-beam tubes and to determine possible means of improving performance. Four lines of approach were chosen and were designated as follows: fundamental phenomena in linear-beam tubes; efficiency enhancement and velocity-filter study; investigation of the response of linear-beam tubes to nanosecond pulses; and study of noise cancellation in traveling-wave tubes. The studies of fundamental phenomena in linear-beam tubes are directed toward obtaining a better understanding of tube behavior, whereas the remaining three approaches deal with specific problems of linear-beam tube performance. (Author)

AD-429 799 Div. 8, 26
OTS price $4.60

Sperry Microwave Electronics Co., Clearwater, Fla.
PRODUCTION ENGINEERING MEASURE YIG SPHERES AND LIMITERS.
Quarterly progress rept. no. 2, 29 Aug-29 Nov 63,
by J. Andrews and D. Tribby. 29 Nov 63, 1v.
Rept. no. SJ222 045 2
Contract DA36 039AMC01477E
Unclassified report

Descriptors: (*Ferroelectric crystals, Manufacturing methods), (*Limiters, Radiofrequency power), Production, Iron, Garnet, Yttrium, Processing, Test methods, Ferromagnetic materials, Polishes, Spheres, Surface properties, Industrial equipment, Lathes, Encapsulation, C band, L band, S band, Tuned circuits, Crystal growth.

Efforts were continued on the establishment of a production engineering measure on YIG (yttrium, iron, garnet) spheres for use as power limiters. An increase was derived in the efficiency and productivity of the sphere forming process. Power limiters were designed and fabrication of these limiters was started. Test techniques were advanced by the improved efficiency in measurement of line widths. The firing of single crystal material proceeded. (Author)

AD-429 805 Div. 8, 25
OTS price $12.00

Cruft Lab., Harvard U., Cambridge, Mass.
LARGE SIGNAL THEORY OF AVALANCHE TRANSISTOR CIRCUIT OPERATION,
by J. S. T. Huang and A. A. Pandiscio. 16 Sep 63, 1v. Rept. no. TR424
Contract Nonr1866 16, Proj. NR372 012
Unclassified report

Descriptors: (*Transistors, Theory), Switching circuits, Transients, Avalanche diodes, Equations, Negative resistance circuits, Integral equations, Solid state physics, Measurement, Feedback.

The present study is concerned with the transient analysis of avalanche transistor pulse circuits from which fast current pulses are obtained. The transistor, when properly biased in the avalanche mode, is seen to exhibit a negative resistance at the collector-emitter terminals. The existence and significance of a reactive element associated with such negative resistance are thoroughly discussed. (Author)

AD-429 809 Div. 8, 26
OTS price $2.60

Weston Instruments Div., Daystrom, Inc., Newark, N. J.
PRODUCTION FACILITIES FOR MULTI-TURN METAL-FILM TRIMMER RESISTORS PER SIGNAL CORPS TECHNICAL REQUIREMENTS SCS-127 DATED 9, FEBRUARY, 1962.
Quarterly progress rept. no. 5, 1 July-30 Sep 63. 30 Sep 63, 1v.
Contract DA36 039sc86734
Unclassified report

Descriptors: (*Variable resistors, Production), Test equipment (Electronics), Manufacturing methods, Resistance (Electrical), Metal films, Quality control.

Assembly and production tooling has been completed and is sufficient to meet the requirements of the contract. Several refinements of the assembly tools have been made. Quantities of parts sufficient to fabricate the pre-production samples are available with the exception of satisfactory toroid contact springs. The test equipment has been checked out with several deficiencies noted, and corrective action has been initiated. Testing of 200 pre-production samples by Quality Acceptance has been rescheduled to start on October 1, 1963, with 100 toroids being added on November 1. Three items which require concentrated effort to enable us to meet the 350 per eight hour shift production rate are the automatic adjuster lathe, the 16 cavity mold and the single cavity molded adjustor head. (Author)

AD-429 814 Div. 8, 25
OTS price $2.60

RADCOM-Emertron Div., Litton Systems, Inc., Silver Spring, Md.
FREQUENCY TUNING BY PARAMAGNETIC RESONANCE,
by F. Ryder, R. Snider and H. Anderson.
Dec 63, 17p.
Contract AF30 602 2938, Projs. 4505, M1556, Task 450501
RADC TDR63 526 Unclassified report

Descriptors: (*Tuning devices, Nuclear magnetic resonance), (*Band-pass filters, Tuning devices), (*Manufacturing methods, Tuning devices), Microwave frequency, Attenuation, Resonance, Radiofrequency amplifiers, Configuration, Inductance, Coils.

Studies continued on the construction of a tunable filter employing nuclear magnetic resonance. Based on earlier experimentation, an induction head was designed and built to stringent specifications. Tests continued, using this head and an earlier model. A nuclear polarization experiment, using electron spin resonance at microwave frequencies, was set up, and enhancement of the nuclear resonance signal was observed. (Author)

AD-429 822 Div. 8
OTS price $7.60

GM Defense Research Labs., Santa Barbara, Calif.
STUDY OF A THERMOPHOTOVOLTAIC CONVERTER.
Quarterly progress rept. no. 3, 1 Sep-30 Nov 63, Jan 64, 76p. Rept. no. TR64 04
Contract DA36 039AMC02255E, Proj. 1G6 41209D534 10 Unclassified report

Descriptors: (*Solar cells, Germanium), Production, Measurement, Electric potential, Electric currents, Impurities, Goniometers, Vapor plating, Metal films, Gold, Aluminum, Vacuum apparatus, Heat exchangers, Calorimeters.

Work continued on the experimental preparation of germanium photovoltaic cells. V-I measurements were made using the 2800 C tungsten lamp source, the tungsten lamp 1400 C-Simulator, and the SiC laboratory test burner at temperatures of about 1200 C. The relative energy distribution in the image plane of the 1400 C-Simulator was determined. Theoretical studies were made on doping levels and optimum design configurations in relation to output power, temperature degradation of output power, and infrared absorption. The energy loss due to spacing gaps between cells was developed. The reflectance goniometer was completed and preliminary measurements taken. New samples have been fabricated for reflectance measurements: vacuum-deposited gold and aluminum on polished fused silica and vacuum-deposited gold on polished germanium wafers. Materials of construction for the burner and heat exchanger have been investigated further. Design work has continued on the more conventional design and on a periodic-flow heat exchanger. A calorimeter has been remetallized with improved vacuum gold-depositing techniques, and with it the gas-fired SiC mantle has been brought up to 1395 C. (Author)

AD-429 852 Div. 8
OTS price $7.60

Chu Associates, Framingham, Mass.
MULTIPLE PLATE ANTENNA ANALYSIS,
by Roy Glasser, Robert L. Lagace, William Montville, Richard K. Bennett and Richard G. Mills. 10 Dec 63, 74p. SR no. 1
Contract AF19 628 297, Proj. 4600, Task 460007
AFCRL 63 585 Unclassified report

Descriptors: (*Antennas, Metal plates), Errors, Parabolic antennas, Antenna configurations, Antenna feeds, Equations, Reflectors,

Bandwidth, Computers, Control systems, Sandwich construction, Rotation, Thickness, Density, Special purpose computers, Circuits, Gates (Circuits), Relaxation oscillators, Scanning.

The multiple-plate, antenna-system concept is covered in detail. General design parameters are examined and design equations formulated. Specific design approaches in the major design areas are discussed. The system requirements covered include: antenna design requirements, computer requirements, antenna plate, mechanical design and the antenna drive system. (Author)

AD-429 859 Div. 8
OTS price $12.00

Pickard and Burns Electronics Div., Gorham Corp., Waltham, Mass.
ATOMIC OSCILLATOR DEVICE FOR NAVIGATION-GUIDANCE,
Interim engineering rept. no. 1,
by R. H. Woodward, L. Johnson, R. Sanborn, I. Felch and G. Taylor. 30 Oct 63, 165p. Pub. no. 859
Contract AF33 657 11384, P and B Proj. 387
Unclassified report

Descriptors: (*Microwave oscillators, Cesium electron tubes), Space navigation, Space environmental conditions, Performance (Engineering), Servomechanisms, Frequency modulation, Crystal oscillators, Signal generators, Stability, Models (Simulations).

The preparation of specifications and designs for the major subassemblies for a pair of experimental models of the ultrastable Atomic Oscillator Device for Navigation-Guidance is covered. The purpose of the first pair of experimental models is to demonstrate a stability of plus or minus 5 parts in 10 to to the 14th power over the specified temperature range of -54 degrees C to 71 degrees C and over an input voltage range of plus or minus 20 percent. Later models are to be designed to meet the requirements for size (1/2 cubic foot), weight (40 pounds) and power consumption (50 watts). (Author)

AD-429 875 Div. 8
OTS price $1.60

Keystone Electronics Co., Newark, N. J.
CRYSTAL UNIT CR-(XM-30)/U.
Quarterly progress rept., Jan-Mar 63,
by James M. Ronan. Mar 63, 13p.
Contract DA36 039sc85940
Unclassified report

Descriptors: (*Crystal holders, Quartz resonators), (*Quartz resonators, Crystal holders), Very high frequency, Seals (Stoppers), Crystal oscillators.

Difficulties encountered with the recently received supply of miniature glass holders is reported together with a discussion of the differences in dimensions between the experimental and single service specification holders. Difficulties experienced in sealing the crystal units because of changes in frequency are reported. (Author)

AD-429 882 Div. 8, 26
OTS price $16.00

Bendix Radio Div., Bendix Corp., Baltimore, Md.
DESIGN TECHNIQUES FOR LONG TERM RELIABILITY OF AEROSPACE ELECTRONIC COMMUNICATION EQUIPMENT.
Dec 63, 229p.
Contract AF33 657 9147, Proj. 4335, Task 433515
RTD AL TDR641 Unclassified report

Descriptors: (*Radio communication systems, Reliability (Electronics)), (*Reliability (Electronics), Radio communication systems), (*Feasibility studies, Radio communication systems), Ultrahigh frequency, Radio transmitters, Radio receivers, Metal films, Time, Mathematical models, Redundant components, Equations, Frequency multipliers, Transistors, Gain, Bandwidth, Varactor diodes, Oscillators, Volume, Weight, Power supplies, Microminiaturization (Electronics), Mathematical prediction, Tunnel diodes, Tables, Failure (Mechanics), Modulation, Superhigh frequency.

The primary purpose of this program is to develop design techniques, aimed at achieving long term reliability of aerospace electronic communications equipment, upon which the design and construction of future equipment of this type can be based. The reliability goal is 10 to 20 years mean-time-between-failure for transceiver operating in the 10 to 17 GC frequency range. Other program goals are the development of techniques to reduce the equipment size and weight. This report summarizes the accomplishments of the study and investigation phase of the program and outlines the intended design approach to be followed in the development of the feasibility model transceiver. A prediction of the performance characteristics of the model is included, along with recommendations for future engineering research. Problem areas are discussed and design tradeoffs evaluated. (Author)

AD-429 888 Div. 8, 12, 7
OTS price $10.50

Boeing Co., Seattle, Wash.
ELECTRO-INTERFERENCE TEST ON MINUTEMAN FIGURE ''A'' 9164, POWER SUPPLY SET, LAUNCH CONTROL PROTECTIVE SYSTEM,
by I. A. Buffington. 8 Aug 62, 134p. Test no. 2 2759
Contract AF04 647 757
Unclassified report

Descriptors: (*Power supplies, Radio interference), (*Radio interference, Measurement), Electromagnetic shielding, Tests.

The following RFI tests were performed: Conducted Generation, transient and steady-state, Radiation Generation, transient and steady-state. Conducted and radiated interference generation was measured and found to be, in most instances, above the limit. Temporary suppression measures were installed upon completion of RFI tests and certain modes were spot checked to determine the effectiveness of the suppression. In modes 1 and 4 the interference level was lowered appreciably, however, modes 2 and 5 showed little improvement. (Author)

AD-429 916 Div. 8
OTS price $3.60

Union Carbide Consumer Products Co., Parma, Ohio.
DEVELOPMENT OF THIN ORGANIC ROLLED FILM CAPACITOR.
Quarterly rept. no. 2, 1 Oct-31 Dec 63,
by L. F. T. M. Adams, R. L. Burdick, V. M. Kennedy and R. L. Prunty. 31 Dec 63, 27p.
Contract NObsr89519, Proj. SR0080302ST9636
Unclassified report

Descriptors: (*Capacitors, Organic materials), Dielectric films, Surface properties, Decontamination, Electrolytic polishing, Foils, Encapsulation, Tests, Life expectancy, Aluminum, Manufacturing methods, Coatings.

Contents: Substrate preparation--Surface decontamination; Mechanical smoothing; and Electrochemical polishing; Evaluation of coated foils--Slitting--Termination--Encapsulation--Life Testing--Sample Capacitors--Test summary.

AD-429 920 Div. 8, 26
OTS price $15.50

Fairchild Semiconductor Div., Fairchild Camera and Instrument Corp., Mountain View, Calif.
PRODUCTION ENGINEERING MEASURE 2N914 AND 2N995, VOLUME I.
Final rept., 1 May 62-31 Oct 63,
by P. M. Weiler. 31 Oct 63, 1v.
Contract DA36 039sc86726
Unclassified report

Descriptors: (*Transistors, Manufacturing methods), Epitoxial growth, Silicon, Fixed contacts, Reliability (Electronics), Plating, Metal coatings, Production, Processing, Vapor plating, Mechanical drawings, Bonding, Aluminum, Data, Tests, Ultrasonic radiation, Gold, Jigs, Thermal stresses, Temperature.

Efforts concerned the establishement of a production engineering measure for improvement of production techniques to increase the reliability of 2N914 and 2N995 silicon planar epitaxial transistors. Processes improved included: Lead attachment; Preparation of substrate for epitaxial growth; Header plating; Particle elimination; and Aluminum deposition. This volume presents the results of the lead attachment improvement phase of the program. The change in metal systems, small ball bonding, wire study, ultrasonic bonding and dynamic and stpp stress testing. (Vol. II is AD429 921). (Author)

AD-429 921 Div. 8, 26
OTS price $16.00

Fairchild Semiconductor Div., Fairchild Camera and Instrument Corp., Mountain View, Calif.
PREPARATION OF SUBSTRATE FOR EPITAXIAL GROWTH. VOLUME II. SECTION III. TASK 2.
Final rept., 1 May 62-31 Oct 63.
31 Oct 63, 1v.
Contract DA36 039sc86726
Unclassified report

Descriptors: (*Transistors, Manufacturing methods), Epitaxial growth, Silicon, Production, Processing, Test methods, Chemical milling, Polishes, Surface properties, Contamination, Specifications, Electrolysis, Electrolytic polishing, Crystal lattice defects, Saws, Reliability (Electronics) Vapor plating, Aluminum, Impurities.

Research concerned the establishment of a production engineering measure for improvement of production techniques for the 2N914 and 2N995 silicon planar epitaxial transistors. This volume presents results of the preparation of substrate for epitaxial growth, header plating particle elimination and aluminum deposition phases of the program. Final operating specifications and production data are presented along with a summary of the work performed. (Vol. I is AD429 420). (Author)

AD-429 933 Div. 8
OTS price $6.60

Polytechnic Inst. of Brooklyn, N. Y.
A NEW THEORY OF BROADBAND MATCHING,
by D. C. Youla. Jan 64, 65p. Rept. no. 1172 63
Contract AF30 602 2868, Proj. 8505
RADC TDR63 512 Unclassified report

Descriptors: (*Impedance matching, Theory), Electrical networks, Broadband, Gain, Matrix algebra, Numerical analysis, Simultaneous equations, Taylor's series, Electrical impedance.

The development is presented of a new and broadband matching theory based upon the principle of complex normalization which completely circumvents the objections to the complications of application of the elegant Fano theory. Nontrivial fully worked examples are included. The restrictions in power gain are expressed in both integral and nonintegral form. (Author)

AD-429 954 Div. 8, 20
OTS price $2.60

Harry Diamond Labs., Washington, D. C.
RADIATION-INDUCED CABLE CURRENTS PART I,
by Dale R. Schallhorn, Edward E. Conrad and Elmer I. Ellsworth. 30 Dec 63, 34p.
HDL TR1167 Unclassified report

Descriptors: (*Coaxial cables, Radiation damage), (*Radiation damage, Coaxial cables), Electric currents, Electrical conductance, Configurations, Measurement, Experimental data, Gamma rays, Tests, Polarization, Neutrons.

RG-58/u, RG-59 B/u, and RG-62/u coaxial cables were exposed to pulsed radiation in the Diamond Ordnance Radiation Facility (DORF) reactor. Conductance and replacement currents were measured with two different cable configurations--one with the irradiated portion looped into a hairpin shape, the other with the irradiated end of the cable fastened to a terminal board and the entire assembly exposed to the radiation. Data were obtained as a function of distance from the radiation source in the reactor and in a neutron-free Co60 gamma ray environment. The test results suggest that the polarity of the replacement current depends on the energy and type of incident radiation. It was determined that cables can be used to perform experiments in DORF without introducing more than 0.8 microamp replacement current at the peak of the reactor pulse. (Author)

AD-429 955 Div. 8
OTS price $3.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
A VERSATILE ELECTRONIC CROWBAR SYSTEM,
by S. Schneider, M. H. Zinn and A. J. Buffa.
Dec 63, 33p.
Task 1G6 22001A055 02
AELRDL TR2407 Unclassified report

Descriptors: (*Electronic switches, Electric discharges), Klystrons, Trigger circuits, Test equipment (Electronics), Electric arcs, Electrodes, Pulse generators, Capacitors, Computer logic.

The development of high-power modulating-anode klystrons has presented the equipment design engineer with the problem of providing adequate protection for the klystron in the event of a fault. A versatile electronic crowbar system has been developed to provide for this contingency. This single quotes system consists of two units: 1. a multiple-gap fixed-space discharge unit capable of operating with an infinite range, that is, from zero plate voltage to the maximum operating voltage; and 2. a logic unit capable of providing a series of trigger pulses programmed for the particular needs of the system. The sys-

tem provides protection against the initial capacitor discharge and limits capacitor recharge until the circuit breakers have opened. A particular application for an equipment operating at 140 kv, 8 amperes average current, with an energy storage bank of 110,000 joules, is discussed. (Author)

AD-429 988 Div. 8
OTS price $2.60

American Machine and Foundry Co., Stamford, Conn.
30 FOOT LIGHTWEIGHT TELESCOPIC MAST, PHASE I.
Quarterly rept. no. 1, 1 July-30 Dec 63,
by Lewis V. Smith. 30 Sep 63, 25p. Rept. no. SCL4549
Contract DA36 039AMC03309E, Proj. 3B24 01 003
Unclassified report

Descriptors: (*Antenna masts, Extendable structures), Weight, Productions, Mechancial properties, Aluminum, Glass textiles, Pipes, Dacron, Tests, Supports, Wire, Wind, Springs.

Research concerns the development of a telescopic antenna mast. A 30 ft lighweight mast was developed after considering various materials for suitability as to strength, availability, and production processes. Fiberglass and aluminum were the major materials considered. A design utilizing both materials was developed. Drawn aluminum tubes are used for eight of the telescopic mast sections. Fiberglass is used for the lowest mast section which serves as the case. The case cap is also fiberglass along with three guy spools which nest in the cap. Guys are dacron. A special spring mechanism which locks the extended mast sections was developed. (Author)

AD-429 993 Div. 8, 26
OTS price $2.60

General Electric Co., Owensboro, Ky.
7486 CERAMIC TRIODE, PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 5, 1 July-30 Sep 63,
by J. D. Marshall. 30 Sep 63, 26p.
Contract DA36 039sc86738
Unclassified report

Descriptors: (*Triodes, Production), (*Vacuum seals, Triodes), Life expectancy, Test equipment (Electronics), Vacuum pumps, Tests, Diffusion pumps.

The ion pump vacuum exhaust equipment has been placed in operation. Tubes have been made for comparison of this type of vacuum system and the present oil-diffusion type vacuum system. The results of life tests on tubes of the lot from which the second engineering sample was drawn are presented. (Author)

AD-429 994 Div. 8, 26
OTS price $4.60

Sylvania Electric Products, Inc., Woburn, Mass.
PRODUCTION ENGINEERING MEASURE FOR GALLIUM ARSENIDE VARACTOR DIODE.
Quarterly progress rept. no. 6, 1 Sep-30 Nov 63,
by T. Baker. 30 Nov 63, 47p.
Contract DA36 039sc86736
Unclassified report

Descriptors: (*Varactor diodes, Manufacturing methods), (*Manufacturing methods, Production), Arsenic alloys, Gallium alloys, Epitaxial growth, Etched crystals, Temperature.

Pre-production processing for the gallium arsenide varactor diode is described in detail. Army approved description of test equipment, and the final SCS-128 specification amendment #2, dated 29 October 1963, are included. (Author)

AD-429 995 Div. 8
OTS price $1.60

Trinity Coll., Dublin (Erie).
SINGLE ELECTRON SPECTRA IN PHOTOMULTIPLIERS.
Final technical rept., 1 Dec 62-30 Nov 63,
by C. F. G. Delaney. 30 Nov 63, 20p.
Contract DA91 591EUC2749
Unclassified report

Descriptors: (*Photomultipliers, Theory), Statistical distributions, Electrons, Protons, Anodes (Electron tubes), Cathodes (Electron tubes), Electric potential.

Research concerns an investigation of whether the single electron spectrum of certain photomultipliers (i.e. the pulse spectrum at the anode when the cathode was illuminated with single photons) is compatible with a Poissonian distribution of secondaries at each dynode, or not. It was concluded that when certain precautions are taken, the tubes investigated show spectra which are compatible with Poissonian distributions at the dynodes. (Author)

AD-430 041 Div. 8, 24
OTS price $10.10

David Sarnoff Research Center, Princeton, N. J.
RESEARCH AND DEVELOPMENT ON PHOTOCONDUCTIVE PHOTO-TAPE.
Interim rept. no. 2,
Jan 64, 129p.
Contract A33 657 11485, Proj. 6263, Task 626302
Unclassified report

Descriptors: (*Camera tubes, Electrostatic fields), (*Manufacturing methods, Camera tubes), (*Photographic recording media, Production), Tapes, Electron optics, Photoconductivity, Electron guns, Cathodes (Electron tubes), Magnetic fields, Ceramic materials, Video amplifiers, Optical equipment, Deflection coils, Electronic equipment, Sensitivity, Electron beams, Storage.

This is the second interim-engineering report on a program directed toward the development of techniques and demonstration equipment for a system to store optical images of electrostatic charges distributed on a tape. This program is divided into two primary areas, the first of which is the demonstration of specified performance levels in terms of available hard-copy records out of the reproducer, using the laboratory models available. The second is to demonstrate the feasibility of building higher-performance cameras based on the Photo-Tape concept by employing laboratory models of individual components. (Author)

AD-430 076 Div. 8
OTS price $9.60

Electronics Research Lab., U. of Calif., Berkeley.
TIME-VARYING GC NETWORKS,
by A. Paige. 11 Oct 63, 114p. Rept. no. 63 25
Grant AF AFOSR62 340, AF AFOSR139 63
Unclassified report

Descriptors: (*Networks, Theory), Numerical analysis, Impedance matching, Capacitance, Time, Design, Matrix algebra.

The purpose of this investigation is to study the properties of time-varying G-C networks. These networks are constructed from one of the

following models: (1) A number of resistances and capacitances can have their values altered mechanically (e.g., rheostats and variable capacitors) and are driven by some mechanical agency. (2) The study of the stability of nonlinear networks can usually be reduced to a study of stability of a linear equation which describes a small perturbation about some equilibrium state of the nonlinear network. This linear equation will, in general, have coefficents which are functions of time. If the type of elements in the nonlinear network are suitably restricted, the linear perturbation equation can be interpreted as describing the operation of a linear time-varying conductance-capacitance network. (Author)

AD-430 078 Div. 8, 15
OTS price $6.60

Electronics Research Lab., U. of Calif., Berkeley.
OPTIMAL CONTROL OF SYSTEMS WITH STOCHASTIC DISTURBANCES,
by Raphael Sussman. 25 Nov 63, 69p. S63 I20
Grant AF AFOSR139 63
Unclassified report

Descriptors: (*Noise, Stochastic processes), (*Optimization, Control systems), Theory, Feedback, Polynomials, Filters (Electromagnetic waves), Real variables.

The Optimal Control of a Linear System which is disturbed by white (or Linear Markov) additive noise is discussed. The state of the system cannot be measured directly, but is corrupted by additive white (or Linear Markov) noise. The Cost Function used is quadratic. It is proved that the Optimal Controller is a linear function of the observations only if both noises are Gaussian. This implies that the minimal cost of controlling this system, when subjected to Gaussian noise, is strictly higher than when subjected to any non-Gaussian noise, which has the same second order properties as the Gaussian. Besides this proof, Kalman's Best Linear Optimal Controller is extended to a Polynomial Controller. This controller retains the same features as Kalman's Best Linear Controller; namely, only the first few moments of the Best Estimate must be updated as the process evolves. While the Optimal Linear Controller requires the updating of only the mean and the variance, the n-th order Polynomial Controller requires the updating of the 2n first moments. These results can also be applied to Optimal Filtering. (Author)

AD-430 079 Div. 8
OTS price $8.60

Electronics Research Lab., U. of Calif., Berkeley.
THEORY AND MEASUREMENT OF A SURFACE WAVEGUIDE,
by David E. Norton. 25 Nov 63, 98p. S63 I21
Grant AF AFOSR139 63
Unclassified report

Descriptors: (*Waveguides, Theory), Electromagnetic fields, Measurement), Electric fields, Transmission lines, Equations, Transformations (Mathematics), Scattering, Superhigh frequency.

A surface waveguide, which consists of a dielectric slab backed by a perfect conductor lying between and perpendicular to two parallel conducting planes, is excited by a slot source at a frequency of 9,339 Mc. The resulting electromagnetic fields are obtained both experimentally and analytically. The fields are measured by the reflection from a thin metal cylinder and this technique is shown to be accurate within one db for test cases with no dielectric present. Two components of the electric field are measured over distances from 0.5 gamma to 25 gamma from the source for eight thicknesses of Plexiglas ranging from 0.10 inch to 0.30 inch. In the analysis of the problem, the dielectric is considered to include loss and the Fourier integral transform for the field is evaluated by the method of steepest descents. An asymptotic expansion results which consists of the saddle point and pole contributions. It is shown that the 'improper' and 'leaky' poles as well as surface wave poles contribute to the fields. In this treatment correction terms are added to the usual residues to assure continuity of the fields everwhere and a decay away from the source in all directions for all pole contributions. (Author)

AD-430 089 Div. 8, 15
OTS price $4.60

Aerospace Corp., Los Angeles, Calif.
THE RADIATION FIELD OF A MAGNETIC DIPOLE ANTENNA IN A CONICAL SHEATH,
by D. C. Pridmore-Brown. 11 Dec 63, 45p.
Technical data rept. 269 4280 10 2
Contract AF04 695 269
SSD TDR63 319 Unclassified report

Descriptors: (*Dipole antennas, Antenna radiation patterns), (*Antenna radiation patterns, Dipole antennas), (*Mathematical analysis, Antenna radiation patterns), (*Plasma sheath, Dipole antennas), Differential equations, Antenna lobes, Integral equations, Perturbation theory, Hypervelocity projectiles, Telemeter systems, Attenuation, Shock waves.

The radiation pattern of a magnetic dipole antenna that is situated on the axis of a cone of finite conductivity, such as a conical plasma sheath, has been calculated. The analysis makes use of Greens functions in terms of which an integral equation is set up for the induced current distribution in the conical sheath. This integral equation is then solved by a perturbation technique that is based upon the assumption that the sheath is highly reflecting. Finally, the current distribution calculated in this way is used as a source to obtain the far-field radiation pattern. In the case of a 10 degree cone and a wavelength of 2pi times the distance between the antenna and the apex, this pattern exhibits lobes at 60 and 130 degrees from the conical axis. (Author)

AD-430 092 Div. 8
OTS price $14.50

Ampex Corp., Redwood City, Calif.
DESIGN OF FILTERS AND NETWORKS,
by E. Pezirtzoglou. Oct 63, 212p. Rept. no. TR62 11
Unclassified report

Descriptors: (*Electric filters, Handbooks), (*Handbooks, Electric filters), Design, Equations, Tables, Phase shifters, Delay lines, Coils, Attenuation, Low-pass filters, High-pass filters, Band-pass filters, Electrical networks, Video filters.

A handbook is presented on filter designs. The problem of filter design is the synthesis of networks having prescribed amounts of discrimination between the wanted and the unwanted bands of the frequency spectrum. Existing textbooks on filters, however, concentrate on theoretical principles and give comparatively little attention to the needs of the practical designer. The present work is an attempt to supplement such

texts by providing, in a convenient form, charts, tables and formulas which have been selected or constructed to lighten the labor of calculation as much as possible. (Author)

AD-430 111 Div. 8
OTS price $1.10

Illinois U., Engineering Experiment Station, Urbana.
A SYSTEM OF TEMPERATURE COMPENSATION OF THE RESONANT FREQUENCY OF TUNED CIRCUITS,
by Emory A. Wakat, Jr. 12 July 63, 9p. Rept. no. TN19
Contract Nonr1834 02
Unclassified report

Descriptors: (*Tuned circuits, Temperature coefficient of reactivity), (*Oscillators, Temperature sensitive elements), Test methods, Coils, Inductance, Capacitors, Capacitance, Measurement, Temperature control.

A system of temperature compensation of the resonant frequency of tuned circuits is described. The system was developed in order to temperature compensate tuned circuits used in a narrow-band matched channel I.F. amplifier. (Author)

AD-430 119 Div. 8, 5
OTS price $9.60

ITT Communication Systems, Inc., Paramus, N. J.
EUR-MED TROPO SYSTEM PATH LOSS TESTS.
30 Nov 61, 114p.
Contract AF19 626 4, Proj. ICS61TR24
Unclassified report

Descriptors: (*Troposphere, Propagation), (*Radio transmission, Propagation), Refraction, Tests, Test equipment (Electronics), Ultra high frequency, Test methods, Parabolic antennas, Gain, Attenuation.

The results are documented of path loss tests conducted in the European-Mediterranean area between the months of February and September 1961. These tests were performed in accordance with the requirements of Task II of the Statement of Work for the system design of the European-Mediterranean Tropospheric Scatter Communication System, USAF Contract AF19(626)-4. All transmission paths, with one exception, were tested on a frequency of 1965 mc, and on one path, Reggio-Wheelus, a comparison was also made on a frequency of 872 mc; the exception was the Humosa-Majorca path where a frequency of 872 mc only was employed. The path loss tesing equipment consisted of crystal controlled transmitters, crystal controlled narrow band receivers with recorders, paraboloid antennas, transmission lines and power units. (Author)

AD-430 137 Div. 8, 26
OTS price $4.60

General Electric Co., Schenectady, N. Y.
SILICON PLANAR EPITAXIAL TRANSISTOR TYPE 2N2193.
SILICON GROWN DIFFUSED TRANSISTOR TYPE 2N336.
Quarterly rept. no. 6, 31 July-31 Oct 63,
by A. S. Rugare. 31 Oct 63, 50p.
Contract DA36 039SC86727
Unclassified report

Report on Production Engineering Measure.

Descriptors: (*Transistors, Production), (*Manufacturing methods, Transistors), (*Production, Manufacturing methods), Silicon, Epitaxial growth, Reliability (Electronics), Temperature, Etched crystals, Evaporation, Vacuum, Boron, Phosphorus, Bonding, Life expectancy, Tables, Ground (Electrical).

The group of units tested showed an extreme degree of resistance to surface inversion or accumulation mechanisms, which is the most common mode of failure usually encountered in bias or power tests. This indicates an oxide passivation of very high quality containing few chargeable or ionizable states. The few electrical failures that fell out of the bias tests and power dissipation tests were traceable to bulk defects mostly located in the aluminum ring area. The majority of failures off the 1.2 watt test are believed to be due to some accidental mishandling of this group of devices. Most of the failures from the 1.6 watt test are unique in that the bulk defects, if any, which initiate a catastrophic collector to emitter shorting are those located in the emitter area. The end point condition of these devices is so severly degraded that point of failure initiation is effectively masked. (Author)

AD-430 138 Div. 8
OTS price $2.60

SFD Labs., Inc., Union, N. J.
DEVELOPMENT OF A Ku-BAND CROSSED-FIELD AMPLIFIER.
Interim engineering rept. no. 2, 30 Sep-31 Dec 63,
by John McBride and Fred Feulner. Jan 64, 22p.
Rept. no. 32IDR2
Contract NObsr89517, Proj. SR0080301ST9391
Unclassified report

Descriptors: (*Microwave amplifiers, K band), Design, Production, Gain, Impedance matching, Tests, Magnetic fields, Performance (Engineering), Waveguide windows.

The second interim engineering report on a Ku-band crossed-field amplifier development program is presented. Two tubes were constructed and tested. A detailed account of the results obtained from these two tubes is presented. The development of mechanical techniques as they apply to the fabrication of the Ku-band amplifier and design changes which were indicated by the data of these two tubes are also included. (Author)

AD-430 144 Div. 8, 25
OTS price $2.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
AN APPRAISAL OF TRANSISTOR THERMAL RESISTANCE AND JUNCTION TEMPERATURE,
by Bernard Reich and Edward B. Hakim. Nov 63, 23p.
Task 1G622001A056 01
AELRDL TR2364 Unclassified report

Descriptors: (*Transistors, Thermal conductivity), Temperature, Measurement, Test methods, Electric potential, Electric currents, Errors.

The current state-of-the-art of pulsed thermal resistance measurements is reviewed. Some of the reasons are presented for the apparent lack of correlation in thermal measurements when these techniques are used. Two techniques of continuous thermal resistance measurements are presented and possible sources of error indicated. Some preliminary data is presented which indicates that thermal resistance measurements made by the continuous hFE technique is the most sensitive method currently known. (Author)

AD-430 151 Div. 8, 26
OTS price $2.60

General Electric Co., Lynchburg, Va.
MICROMINIATURE CRYSTAL UNITS CR-(XM-47)/U.

Quarterly rept. no. 2, 1 Aug-31 Oct 63,
by W. G. Stoddard. 31 Oct 63, 26p.
Contract DA36 039AMC02232E
Unclassified report

Descriptors: (*Crystal holders, Microminiaturization (Electronics)), (*Manufacturing methods, Crystal holders), Springs, Molybdenum, Electron beams, Welding, Electric terminals, Jigs, Containers, Frequency shift, Mechanical properties, Electric potential, Electric current, Seals (Stoppers).

The results of further feasibility tests in parallel-gap and electron-beam welding of Elgiloy springs to molybdenum post and electron-beam sealing of the holder are presented. Part I: Parallel-Gap Welding of Spring to Post. Parallel-gap welding, a type of capacitor discharge spot-welding, was found to be unsuccessful in welding Elgiloy springs to the molybdenum posts. The molybdenum did not get sufficient heat to melt and mix with the Elgiloy. A poor mechanical joint was formed as the result of the Elgiloy spring melting and forming over the butt of the molybdenum post. Part II: Electron-Beam Welding of Spring to Post. Electron-beam welding of Elgiloy spring to molybdenum post was accomplished successfully. An optimum weld schedule has been derived from these experiments. Part III: Electron-Beam Sealing of Crystals. Crystals mounted in miniature relay holders were electron-beam sealed to find the effects of welding on crystal performance. Where poor fit-up existed between cover and header, excess crystal frequency change was evident. This result stresses the importance of good fit-up between parts before attempting to weld. Application of this technique to the microminiature configuration is described. (Author)

AD-430 157 Div. 8, 26
OTS price $3.60

Clevite Corp., Bedford, Ohio.
PRODUCTION ENGINEERING MEASURE FOR CERAMIC FILTERS.
Quarterly rept. no. 3, 30 Sep-29 Dec 63,
by A. Lungo. 29 Dec 63, 34p.
Contract DA36 039AMC01471E
Unclassified report

Descriptors: (*Electric filters, Ceramic materials), Manufacturing methods, High frequency, Fixed contacts, Disks, Electrodes, Resonators, Production, Electrical Impedance, Resonance, Bandwidth, Band-pass filters.

Efforts were continued on the establishment of a PEM for ceramic filters at frequencies above 1 Mc. The contact evaluation program for the 6.0 Mc first overtone radially resonant disk was completed. The results are presented and discussed. Problems associated with electrode application are described. The status of the other operations in disk fabrication are discussed. The package design was frozen. The parts are being fabricated by a model shop technique. Ladder filters having center frequencies at 1.75 Mc and 6.0 Mc were assembled. The results are presented and discussed. (Author)

AD-430 163 Div. 8, 26
OTS price $12.50

Chatham Electronics Div., Tung-Sol Electric Inc., Livingston, N. J.
PRODUCTION ENGINEERING MEASURE FOR POLYOPTIC SEALING OF HYDROGEN THYRATRON TUBES.
Final rept., 1 Jul 59-31 Jun 63,
by Robert F. Franklin. 15 Dec 63, 176p.
Contract DA36 039sc81289
Unclassified report

Descriptors: (*Thyratrons, Glass seals), Hydrogen, Production, Manufacturing methods, Polishes, Sealing compounds, Heating, Soldering, Metals, Polymers, Welding, Ultrasonic radiation, Automatic, Vacuum apparatus, Cleaning, Degasification.

Efforts concerned an evaluation of the application of polyoptic sealing to hydrogen thyratron production techniques and the investigation of other means of protective sealing. A number of various polishing and sealing techniques were investigated and compared. Various means of sealing methods were attempted: The hot ring localized heating technique; The intermediate material technique, which includes glass solder, enamels, cements, and metals; True polyoptic sealing, in which a near perfect fit of button to bulb permits a seal to be made by intermolecular migration; The ultrasonic welding technique. The hot ring technique of all the methods under investigation proved to be the most satisfactory and practical means for making seals. The sealing and processing of polyoptic tubes was carried out on both automatic and trolley exhaust equipment. Best results were obtained by sealing and processing on trolly exhaust. (Author)

AD-430 177 Div. 8
OTS price $5.60

Illinois Univ., Urbana, Engineering Experiment Station.
MEASUREMENT OF THE PHASE CENTERS OF ANTENNAS,
by John D. Dyson and Robert E. Griswold. Dec 63, 54p. Rept. no. TR66
Contract AF33 657 10474, Proj. 6278, Task 6278 01
Unclassified report

Descriptors: (*Antennas, Antenna radiation patterns), (*Antenna radiation patterns, Phase studies), (*Phase studies, Antennas), Phase measurement, Detectors, Measuring devices (Electrical & electronic), Errors.

There are many antennas, including the log-periodic and log-spiral antennas, that do not have a unique phase center. For these antennas an 'apparent phase center' is defined over a limited range of space surrounding the antenna. A measurement technique has been developed that will permit automatic plotting of modified phase patterns from which the effective position of this 'apparent phase center' may be determined. This technique requires the use of only standard antenna pattern recording equipment and a detector which is sensitive to the amplitude and to the phase of the radiated field of the particular antenna under consideration. Deviations of these patterns from a unit circle on a polar plot or straight line on a rectangular plot (or as a modification, from the amplitude pattern), may be interpreted from curves supplied, to show the position of the phase center with respect to the known center of rotation used to obtain the patterns. (Author)

AD-430 184 Div. 8
OTS price $2.60

Sperry Microwave Electronics Co., Clearwater, Fla.
HIGH POWER FAST FERRITE SWITCHES.
Interim development rept. no. 1, 27 June-27 Sep 63.
27 Sep 63, 27p.
Contract NObsr89428
Unclassified report

Descriptors: (*Electronic switches, Ferrites), (*Waveguide switches, Ferrites), (*Ferrites, Waveguide switches), Radiofrequency power,

Microwave equipment, C band, S band, Tests, Attenuation, Waveguides, Dielectrics, Resonance, Magnetic fields.

Research concerns the design and development of single-pole double-throw high power fast ferrite switches for C-band and S-band. Several possible approaches to the rapid high power switch were considered, and testing was conducted on the approach which appears the most promising, the partially-filled cutoff-waveguide type switch. A brief technical background is presented, and the results of tests are discussed in detail. Satisfactory low power switching characteristics were attained, except that the insertion loss in one case and reflection loss in another are greater than dictated by the device requirements. This approach was tentatively selected as the one to be followed, depending upon the characteristics of the switching elements at high power. (Author)

AD-430 214 Div. 8
OTS price $1.60

Microwave Associates, Inc., Burlington, Mass.
PEM - SOLID-STATE MICROWAVE TR-ATR SWITCH.
Quarterly technical rept. no. 6, 18 July-18 Oct 63,
by Robert H. Brunton. 18 Oct 63, 17p.
Contract DA36 039sc86718
Unclassified report

Descriptors: (*Radar duplexers, Diodes (Semiconductors)), (*Electronic switches, Diodes (Semiconductors)), (*Diodes (Semiconductors), Electronic switches), Manufacturing methods, Mechanical drawings, Production, Test methods, Specifications, Varactor diodes, Life expectancy, X-band, Microwave equipment.

Efforts were continued on the establishment of a PEM on 1.0 lw solid-state X-band microwave TR-ATR switch as used in a balanced duplexer. Manufacturing techniques and all drawings were reviewed and are now complete for preproduction. The assembly and test procedures were completed and are being compiled for inclusion in a manual for preproduction manufacturing operations. Equipment requirements and test bench block diagrams are available for each step in the electrical tests and measurement procedures. Specifications for the crystal bias diodes, PIN and varactor diodes were determined and diodes were ordered. The life test on unit LM 28 continued during this period. (Author)

AD-430 216 Div. 8
OTS price $2.60

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
TECHNICAL NOTE OPERATION OF DISTRIBUTED CONSTANT NEURISTOR ELEMENTS,
by D. R. Zimmerman. 4 Feb 64, 24p.
NADC EL 6374 Unclassified report

Descriptors: (*Electrical networks, Nerve cells), (*Semiconductor devices, Nerve cells), Equations, Power supplies, Negative resistance circuits, Stability, Silicon, Velocity, Propagation, Power, Electric potential, Diffusion.

A discussion is presented of the effects of a distributed power supply layer on the operation of a neuristor device. Equations are derived which approximates the operating characteristics of a neuristor based on a generalized negative-resistance phenomenon propagating by means of carrier diffusion. The results and the theory are discussed from the standpoint of limiting factors controlling neuristor stability and propagation velocity in silicon. (Author)

AD-430 225 Div. 8
OTS price $5.60

Digital Computer Lab., U. of Illinois, Urbana.
TUNNEL DIODE CIRCUITS BASED ON LUMPED CONSTANT CIRCUITRY,
by Tohru Moto-Okra. 9 Aug 63, 50p. Rept. no. 158
Contract Nonr183415
Unclassified report

Descriptors: (*Tunnel diodes, Circuits), (*Switching circuits, Tunnel diodes), Time, Mathematical analysis, Equations, Distributed amplifiers, Networks, Gain, Reliability (Electronics), Transistors, Computer logic, Mathematical models.

Investigation of the speed limit of tunnel diode circuit operation indicates that these circuits should be considered as distributed circuits, because the cut-off frequency of the tunnel diode is more than one thousand megacycles. Methods of obtaining maximum speed tunnel diode circuits may be classified into two groups. One method is that a circuit is designed as a lumped constant circuit originally and, after that, these lumped constant elements are replaced by distributed circuits, if necessary. The other method is that the characteristics of distributed circuitry are used positively and the circuits are designed as distributed circuits from the beginning. The latter method seems to have more difficulties and more possibilities for maximum speed circuits than the former. The former method is used in this report. The linear analysis of resistive networks which include negative resistance elements such as a tunnel diode, are mentioned in Part I. In Part II, the tunnel diode-transistor hybrid logical and switching circuits are mentioned as one example of the application of the theories which are described in Part I. The operating speeds of the hybrid circuits do not seem to be as high as those of all tunnel diode circuits, but they are much more easily designed and more practical in a large digital system. (Author)

AD-430 238 Div. 8, 12
OTS price $1.60

Sylvania Electric Products Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN).
6 Dec 63, 11p. Rept. no. S133 111 9 7
Contract AF04 694 261
Unclassified report

Descriptors: (*Specifications, Antennas), (*Antennas, Specifications), Radiofrequency, Guided missiles (Surface to surface), Air Force, Ground support equipment, Electrical conductance.

This specification covers one type of equipment designated as Antenna, AS-1660/F for the transmission and reception of radio frequency energy. The Antenna is intended for use as part of the MINUTEMAN Ground Electronic System for the transmission and reception of command and status signals. It is intended for unattended operation for long periods in an uncontrolled environment. (Author)

AD-430 249 Div. 8, 5
OTS price $7.60

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
STUDY AND INVESTIGATION OF POLARIZATION PROGRAMMING. VOLUME II. POLARIZATION SYSTEMS ANALYSIS,
by R. S. Berkowitz, J. Choder, P. M. Hahn, R. G. Mulholland and R. F. Schwartz. Jan 64, 74p. Rept. no. 64 02

Contract AF30 602 3105, Proj. 4540, Task 454003
RADC TDR63 396, vol. 2 Unclassified report

Descriptors: (*Communication systems, Polarization), (*Ionospheric propagation, Polarization), (*Polarization, Communication systems), Mathematical models, Troposphere, Propagation, Antennas, Electromagnetic waves, Attenuation, Doppler effect.

The polarization programming problem is defined and a number of references in the study of polarization are given. The choice of frequency range based upon preservation of polarization is discussed and a few factors which can lead to depolarization at higher frequencies are mentioned. A somewhat detailed discussion is given of the polarization effects that take place in propagation via the ionosphere, with some emphasis on future applications to satellite communication. The troposcatter propagation factors affecting a polarization programming system are presented. A general mathematical description of polarized waves of all types and their transmission channel is given. The discussion includes antenna considerations. Two system philosophies and the field of applicability are discussed. Two appendices discuss a statistical model of a fading channel and a specific system incorporating one of the given design philosophies, respectively. The application of polarization programming to an over-the-horizon troposcatter link seems to be feasible, it should lie in the range of 1 to 10 kilomegacyles per second. (Author)

AD-430 257 Div. 8
OTS price $3.60

Electronic Defense Labs., Mountain View, Calif.
THE DESIGN OF BROAD-BAND TUNNEL DIODE AMPLIFIERS,
by Jack Lepoff. 21 Oct 63, 31p. Rept. no. M583
Contract DA36 039AMC00088E
Unclassified report

Descriptors: (*Tunnel diodes, Microwave amplifiers), (*Microwave amplifiers, Tunnel diodes), Broadband, Stabilization, Tuned amplifiers, Gain, Noise (Radio), Tuning devices, Admittance, Electric impedance, Superhigh frequency, Waveguide circulators, Resonators.

An analytic method for designing broad-band tunnel diode amplifiers is presented. A stabilizing circuit is added to a basic double-tuned circuit in order to prevent out-of-band oscillations. Amplifiers were designed for 1-Gc and 2-Gc bandwidths at C band. Models were built with greater than 10-db gain and less than 5-db noise figure over a 1-Gc band. (Author)

AD-430 277 Div. 8
OTS price $1.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
CATHODE-GRID PHENOMENA IN HYDROGEN THYRATRONS,
by J. E. Creedon, S. Schneider and F. Cannata. Dec 63, 19p.
Task 1G6 22001A055 02
AERDL TR2410 Unclassified report

Descriptors: (*Thyratrons, Hydrogen), (*Electrical properties, Thyratrons), Performance (Engineering), Cathodes (Electron tubes), Electric current, Switching circuits, Power, Oxide cathodes.

The performance of the grid-cathode region of hydrogen thyratrons was investigated at pulse lengths of 5, 30, and 1000 microseconds. Experimental results of current capabilities are discussed for several tube types. Cathode arcing appeared to be the limitation in the pressure range studied. The arcing phenomena are empirically related to the cathode-coating resistance, and voltage breakdown values are deduced for various pulse lengths. Performance of the hydrogen thyratron as a switching device for millisecond pulses is discussed. (Author)

AD-430 288 Div. 8
OTS price $9.10

Case Inst. of Tech., Cleveland, Ohio.
MULTIPORT VOLTAGE TRANSFER FUNCTION,
by Togan Zeren. Oct 63, 108p. SR3
Contract AF19 628 1699, Proj 5635, Task 563502
AFCRL 63 592 Unclassified report

Descriptors: (*Electrical networks, Synthesis), Circuits, Numerical analysis, Admittance, Polynomials, Determinants, Functions, Analysis.

After a review of existing work on the transfer function of two-port networks, two new methods of realization for these transfer functions are developed. These methods are based on splitting the denominator by means of even part and Bott-Duffin splitting techniques. The latter split is applicable to cases with or without imaginary axis poles. Next the multiport voltage transfer function matrix is introduced and the different structures of multiport networks are described. The necessary and sufficient conditions for realizability of the transformerless multiport network transfer functions for the different structures are stated and proved. (Author)

AD-430 292 Div. 8
OTS price $2.60

Whirlpool Corp., St. Joseph, Mich.
THERMOELECTRIC TEMPERATURE CONTROL IN AN/URQ-9 FREQUENCY STANDARD.
Interim development rept. no. 11, 1 Oct-31 Dec 63, by A. L. Wennerberg. 15 Jan 64, 30p.
Contract NObsr85314, Proj. SS294001, Task 9215
Unclassified report

Descriptors: (*Crystal ovens, Stability), (*Temperature control, Thermoelectricity), Measurement, Crystal oscillators, Quartz resonators, Radiofrequency, Standards, Aging (Materials), Frequency stabilizers.

Temperature stability measurements within the thermoelectrically controlled temperature crystal chamber were made with high accuracy. Temperature was found to be controlled to within ± 0.01 degrees C of the set point. Frequency measurements made on six low temperature 5 mc crystals are plotted to show their frequency stabilization period and long term aging characteristics. Long term drift rates of precision oscillators coupled to the low temperature crystals were found to be within several parts in 10 to the -11th power per day. Turning-point curves for two of the low temperature crystals were determined and plotted. Performance of the six oscillators after periods of shutdown are reported. The units showed a short stabilization period of a few hours and then went into a new aging curve. (Author)

AD-430 299 Div. 8, 12
OTS price $1.60

Sylvania Electric Products, Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN).
6 Dec 63, 11p. Rept. no. S133 112 9 10
Contract AF04 694 261
Unclassified report

Descriptors: (*Antennas, Specifications), Ground support equipment, Guided missiles

(Surface-to-surface), Military requirements, Radiofrequency.

Model specifications are presented for antenna AS-1661/F for the transmission and reception of radio frequency energy. (Author)

AD-430 316 Div. 8, 26
OTS price $1.60

Keystone Electronics Co., Newark, N. J.
CRYSTAL UNIT CR-(XM-28)/U.
Quarterly progress rept., Apr-June 63,
by James M. Ronan. June 63, 19p.
Contract DA36 039sc81275
Unclassified report

Descriptors: (*Quartz resonators, Manufacturing methods), (*Crystal holders, Quartz resonators), Production, Aging (Materials), Sealing compounds.

The continuing program leading to the development of the production sealing equipment for Crystal Units in H C -27/U glass holder is reported, including the solution of problems of change of frequency during sealing. Results of subjecting bonding cements to high temperatures are reported. Also reported are plans for the aging studies to be performed under the development program and equipment to be used in making the aging measurements. (Author)

AD-430 341 Div. 8, 25
OTS price $4.60

Braddock, Dunn and McDonald, Inc., El Paso, Tex.
NANOSECOND PULSE BREAKDOWN INITIATION AND GROWTH.
Final rept.,
by Daniel F. McDonald and S. J. Brient.
Jan 64, 45p. Rept. no. BQ102
Contract AF30 602 2781, Proj. 4506, Task 450603
RADC TDR63 525 Unclassified report

Descriptors: (*Waveguides, Electric discharges), (*Radar pulses, Electric discharges), Optical equipment, Surfaces, Nickel, Brass, Steel, Molybdenum, Electric fields, Electrodes.

The statistics of gaseous breakdown initiation are analyzed in detail. The probability of immediate breakdown is discussed in terms of the lifetime of electron bursts and the frequency of burst generation by cosmic rays and natural radioactivity. The probability of breakdown during the application of the pulse is discussed in terms of field-assisted electron generation at the walls or electrodes of the test cell. The feasibility of photometric techniques in the study of discharge temporal and spatial growth is considered. (Author)

AD-430 345 Div. 8
OTS price $4.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
OPTIMIZATION OF SIGNALS,
by F. C. Schweppe. 16 Jan 64, 49p. Group rept. no. 64 4
Contract AF19 628 500
ESD TDR64 18 Unclassified report

Descriptors: (*Electromagnetic waves, Design), Radio signals, Radar signals, Mathematical analysis, Theory, Frequency, Time, Physical properties, Propagation, Bandwidth, Modulation, Energy.

A general theory is presented for the design of optimum signal waveforms. Explicit constraints on the signal's energy, amplitude and bandwidth are possible. The development is based on optimum control theory and employs the state variable concept with differential equations as basic models. Pontryagin's Maximum Principle provides a two-point boundary value problem whose solution gives the optimum signal. A communication problem of deciding which of M signals was transmitted and a radar problem of deciding the range rate of a target are used as examples. (Author)

AD-430 349 Div. 8
OTS price $4.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
PROJECT FLAYER III A STUDY OF SPREAD-F ECHOES FROM THE IONOSPHERE.
Final rept.,
by Jacques Renau and W. A. Flood. Aug 63, 48p.
CAL Rept no. RA1684P I
Contract AF19 628 351
Unclassified report

Descriptors: (*Ionospheric propagation, Radio waves), (*Radio waves, Reflection), (*Reflection, Detection), Bandwidth, Angle of arrival, Dipole antennas, Radio transmitter, Signal-to-noise ratio, Radio receivers, Ionospheric disturbances, Measuring devices (Electrical & electronic).

Forty-four cases of Spread-F echoes at 2.4 Mcs were analyzed and the following conclusions were drawn: 1. The width of the video fading spectrum is commonly less than 1/2 cps although occasionally some of the spectra are as wide as 1 cps with much weaker components at 2 cps. 2. The amplitude distribution of Spread-F echoes at 2.4 Mcs obtained from one minute data runs are Rayleigh or Rice distributed only for the strongest and lower altitude echoes. The echoes from the largest slant ranges (and presumably higher altitudes) are neither Rayleigh nor Rice distributed, and they show an unexpectedly large proportion of small or zero amplitude signals, a situation which suggests a sporadic nature of Spread-F echoes. 3. The amplitude correlation coefficient evaluated at a 1700 foot (4 wavelength) spacing is typically much less than 0.4 implying that the cone angle of Spread-F echoes is commonly greater than 5 degrees. It is clear, then, that Spread-F echoes are associated with a greater degree of spread of angle of arrival (cone angle) than are echoes from the normal F-region. (Author)

AD-430 352 Div. 8
OTS price $9.10

Electronics Research Lab., U. of Pittsburgh, Pa.
STUDY OF CROSSED-FIELD AMPLIFIERS.
Final status rept., 1 Jan 60-31 Jan 63,
by J. R. Whinnery, T. Van Duzer, J. R. Anderson, M. A. Pollack and J. F. Rando. 15 Feb 63, 105p. Rept. no. S60I493
Contract DA36 039sc85278
Unclassified report

Descriptors: (*Microwave amplifiers, Magnetic fields), (*Magnetic fields, Microwave amplifiers), Gain, Bandwidth, Effectiveness, Mathematical analysis, Electron beams, Diodes (Electron tubes), Noise (Radio), Stability, Electron tube parts, Backward-wave amplifiers, Magnetrons.

The beam fluctuations propagating through the potential minimum and along the accelerating stream in crossed-field diodes of infinite cross-section have been studied theoretically in four different analyses. Two analyses similar to the Llewellyn-Peterson diode treatment of a

single-velocity stream were done. The space-charge wave differential equation for such a stream was derived. A Monte Carlo numerical study was made on the digital computer for comparison with the approximate theories mentioned above and an approximate theory for the potential minimum. Good agreement was found among the theories at low frequencies and close quantitative agreement of these with a noise measurement was observed. (Author)

AD-430 355 Div. 8
OTS price $6.60

General Electric Co., Irmo, S. C.
HERMETICALLY SEALED ELECTROLYTIC CAPACITOR.
Final rept., 15 May 62-15 Nov 63,
by R. M. Trewhella. 15 Nov 63, 62p.
Contract DA36 039sc89093, Task 3A99 15 002 01
Unclassified report

Descriptors: (*Electrolytic capacitors, Tantalum capacitors), (*Tantalum capacitors, Electrolytic capacitors), Manufacturing methods, Spaceborne, Foils, Life expectancy, Temperature, Compatibility, Glass seals, Nickel alloys, Iron alloys, Titanium, Electric wire, Tantalum, Electric insulation, Materials, Welding.

The ability to develop, design, and fabricate a true or single hermetically sealed foil tantalum electrolytic capacitor for operation in outer space was demonstrated by the successful performance of the final development hermetically sealed capacitors evaluated in accordance with the Signal Corps Test Plan SCL-6417, dated 7 November 1961. The compatibility of the materials used in the final design was further demonstrated in prototype units that have successfully completed 12,000 hours on test at 85 C with rated voltage applied. (Author)

AD-430 365 Div. 8, 16, 30
OTS price $1.60

RF-Communications, Inc., Rochester, N.Y.
DEVELOPMENT OF A MINIATURE TELEMETRY SYSTEM,
by David A. Kavanagh. Nov 63, 16p.
Contract AF41 657 419, Task 775802
SAM TDR63 80 Unclassified report

Descriptors: (*Telemeter systems, Electronic equipment), (*Physiology, Wave transmission), Very high frequency, Telemetering systems, Solutions, Animals, Physiology, Tests, Body, Power supplies, Modulation, Encapsulation, Frequency modulation, Experimental data.

Experiments with VHF miniature transmitters submerged in physiologic saline solution to simulate their being implanted in living animals indicate that internal telemetry from small animals may be feasible at frequencies as high as 200 mc. Further study is needed before conclusions can be drawn relative to the frequency range best suited for large animals. Tests with transmitters below 20 mc. held under a person's armpit indicate that the human body is essentially transparent to internal telemetry signals in that frequency range. Modulation schemes, power supplies, and encapsulants are discussed. (Author)

AD-430 378 Div. 8
OTS price $3.60

Texas Instruments, Inc., Dallas.
DEVELOPMENT OF A TRANSISTOR DELIVERING AN OSCILLATOR OUTPUT OF 250 MILLIWATTS AT 1.5 GIGACYCLES.
Quarterly progress rept. no. 1, 19 June-19 Sep 63,
by K. B. Landress. 14 Feb 64, 37p.
Contract NObsr89423, Proj. SR0080304, Task 9347
Unclassified report

Descriptors: (*Transistors, Manufacturing methods), (*Oscillators, Transistors), (*Manufacturing methods, Production), Epitaxial growth, Electrical properties, Photoengraving, Ultrahigh frequency, Configuration, Electric terminals, Silicon, Mechanical properties.

The necessary glass and metal masks were designed, ordered, and received. The masks were checked for conformance to specifications. Single transistor structures were fabricated on various combinations of epitaxial material resistivity and thickness to determine the optimum combination of electrical device parameters. A technique for defining the deposited emitter material employing only photoresist operations was developed. Prototype models of the header proved to be mechanically deficient and are being suitably modified. (Author)

AD-430 390 Div. 8
OTS price $4.60

Boeing Co., Seattle, Wash.
FEASIBILITY STUDY OF SHIELDING TECHNIQUES.
Quarterly progress rept. no. 2, 1 Sep-30 Nov 63,
by Vellar C. Plantz and David R. Brush.
26 Dec 63, 48p. Document no. D6 8597 1
Contract DA36 039AMC02308E, Proj.
1G6 20501D449 01 18
Unclassified report

Descriptors: (*Electromagnetic shielding, Feasibility studies), Design, Measurement, Materials, Filters (Electromagvetic wave), Frequency, Electrical impedance, Joints, Configuration, Surfaces.

The purpose of this research is to provide reliable information so that an electromagnetic shielding configuration may be designed to provide, or may be verified as providing in actual practice, the required degree of reduction of intercepted electromagnetic waves. Although large quantities of shielding data are available, desired information for a given configuration cannot be projected because surfaces of practical shielding materials do not conform in detail to the ideally uniform media hypothesized in theoretical calculations. (Author)

AD-430 402 Div. 8
OTS price $2.60

Electromagnetic Technology Corp., Palo Alto, Calif.
FREQUENCY CONVERTER UNITS FOR L-BAND, S-BAND, C-BAND AND X-BAND.
Interim development rept. no. 7, 1-31 Jan 64.
14 Feb 64, 30p.
Contract NObsr89536, Proj. SF0100201, Task 9294
Unclassified report

Descriptors: (*Frequency converters, Microwave frequency), (*Microwave frequency, Frequency converters), L band, S band, C band, X band, Frequency multipliers, Frequency dividers, High-pass fileters, Low-pass filters, K band, Semiconductor devices, Crystal mixers, Diodes (Semiconductors), Waveguide filters, Waveguides.

Effort was continued on the development of the frequency converter units. The high-pass filter using a circular bore and tapered input and output sections was completed and tested. A low-pass filter for use in the L.O.hannel of the

X-band converter was designed, built, and tested. A developmental frequency converter unit including a 3db broadwall directional coupler, mounting for two reversed pairs of 1N53 crystals and a coaxial output jack has been designed and is being fabricated. An experimental unit has been used for both up and down frequency conversion. The conversion losses observed in the two directions are alike to one-half db and are in good agreement with the value calculated from the direct current rectified at various levels of K band carrier. Extensive measurements were made of the IF impedance of 1N26 and 1N53 crystals in a simple holder. The internal capacitance of 1N26 crystals is high enough to make IF matching very difficult. The capacitance of 1N53 crystals is substantially lower. Preliminary tests indicate that we will be able to obtain matches consistent with the specified value VSWR = 3. (Author)

AD-430 420 Div. 8
OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
INVESTIGATING IONOSPHERIC DUCTING WITH THE ORBIS BEACON,
by John P. Mullen, Gerald Daniels and Richard Allen. Jan 64, 19p.
Proj. 4643
AFCRL 64 29 Unclassified report

Descriptors: (*Ionospheric propagation, Analysis), Ionosphere, High frequency, Beacons, Satellites (Artificial), Radio beacons, Radio transmission, Wave transmission, Frequency modulation, Radio signals.

An experiment is described which uses a satellite-borne, two-frequency HF beacon to perform a synoptic investigation of inospheric ducting. The expected ducting modes are described qualitatively and quantitatively using the AFCRL ray tracing computers. (Author)

AD-430 422 Div. 8, 30
OTS price $4.60

Sperry Microwave Electronics Co., Clearwater, Fla.
INVESTIGATION OF LARGE SIGNAL MICROWAVE EFFECTS IN FERROELECTRIC MATERIALS.
Quarterly rept. no. 1, 1 July-30 Sep 63,
by J. E. Pippin and T. J. Lyon. Dec 63, 42p.
Rept. no. SJ230 0048 1
Contract DA36 039AMC03240E,
Proj. IG6 22001A055 04
Unclassified report

Descriptors: (*Ferroelectric materials, Research program administration), Microwave bridges, Microwave amplifiers, Microwave equipment, Parametric amplifiers, Harmonic oscillators, Ceramic materials, Measure theory.

AD-430 485 Div. 8, 25
OTS price $4.60

Illinois U., Engineering Experiment Station, Urbana.
INVESTIGATION OF MICROWAVE DUPLEXER SWITCHING MECHANISMS.
Quarterly progress rept. no. 3, 1 July-30 Sep 63,
by J. A. Dayton, Jr., J. T. Verdeyen, L. A. Weaver and L. Goldstein. 30 Sep 63, 49p.
Contract DA36 039AMC00066E, Task 1G6 22001A055 04
Unclassified report

Descriptors: (*Radar duplexers, Plasma medium), (*Acoustic properties, Gases), Shock waves, Electromagnetic waves, Ozone, Measurement, Velocity, Sound transmission, Harmonic oscillations, Propagation, Transducers.

Accoustic waves produced by an intense, localized RF breakdown are used to measure chemical and thermal effects resulting from gas breakdown. Pulsed RF breakdown in oxygen produces ozone. By measuring the velocity of propagation of sound waves in such an ozone-oxygen mixture the percentage of ozone present can be calculated. The rate of decay of pzone can be determined by making this measurement at various times after the cessation of the 1 microsec RF pulse. These acoustic waves are observed to propagate at a velocity slower than the speed of sound in mixtures of xenon with helium, oxygen, nitrogen, and neon. Second harmonic power is produced in a pulsed discharge afterglow plasma and found to display typical behaviour. Microwave power at a second harmonic frequency is also generated by the nonlinear interaction between an electromagnetic wave and an electrically driven shock wave. (Author)

AD-430 492 Div. 8, 25
OTS price $4.60

Clevite Corp., Cleveland, Ohio.
RESEARCH INTO NEW APPROACHES FOR VHF FILTER CRYSTALS.
Quarterly rept. no. 2, 1 Aug-31 Oct 63,
by D. R. Curran and D. J. Koneval. 26 Nov 63, 50p.
Contract DA36 039AMC02245E, Proj. 3A99 15 001
Unclassified report

Descriptors: (*Quartz resonators, Crystal filters), Very high frequency, Cold, Aluminum, Etched crystals, Electrodes, Theory.

Trapped-energy mode theory predicts the existence of inharmonic overtone modes whose resonant frequencies are dependent both on electrode dimensions and on the difference in resonant frequency between the electroded and surrounding regions of an AT-cut quartz wafer. Trapped-energy mode theory also predicts that these modes can have observable responses only when mode resonance occurs below the wafer cut-off frequency. Both predictions have been confirmed for measurements on wafers with rectangular electrodes aligned in the Z' direction. Initial measurements on multielectroded resonators indicate that individual dot-resonators can be electrically connected in parallel to form on one wafer in effect a single large resonator with a strong clean response. Experiments with AT-cut mesa resonators indicate that higer values of mechanical modes can be obtained with larger resonant frequency differences between the mesa region and the surrounding regions of the wafer. However, satisfactory methods for fabricating mesa resonators have not yet been developed. (Author)

AD-430 517 Div. 8
OTS price $1.60

Microwave Devices Lab., U. of Utah, Salt Lake City.
CYCLOTRON WAVE DEVICES STUDY.
Quarterly progress rept. no. 1, 1 July-31 Sep 63,
by T. Kao, D. C. Watson, C. H. Durney, C. C. Johnson and R. W. Grow. 31 Sep 63, 16p.
Contract DA36 039AMC02372, Task IG6 22001A055 04
Unclassified report

Descriptors: (*Cyclotron waves, Microwave amplifiers), (*Microwave amplifiers, Cyclotron waves), S band, Electromagnetic waves, Computers, Design, Effectiveness, Electron guns,

Electric current, Tuning devices, Cavity resonators, Electron beams, Focusing, Space charges, Electron tubes.

Research concerns the evaluation of the high-efficiency capabilities of the cyclotron-synchronous wave amplifier. An experimental evaluation of a one-watt amplifier was made at S-band. A small-signal coupled-mode analysis is being carried out for this device and a large-signal computer study is underway to examine the efficiency capabilities and to provide design data. The S-band amplifier was tested. The gun failed to provide sufficient current due to a faulty gun electrode. The cavity tuning slugs were found to operate satisfactorily. The filamentary stream coupled-mode analysis was modified to account for space-charge and beam focusing effects. (Author)

AD-430 534 Div. 8, 22
OTS price $1.10

Melpar, Inc., Falls Church, Va.
DESIGN AND DEVELOPMENT OF A PERSONNEL-VEHICULAR DISCRIMINATOR.
Monthly letter progress rept. no. 14, 1 Dec 63-1 Jan 64,
by W. B. Wickersham. 16 Jan 64, 9p.
Contract DA36 034ORD3713RD
Unclassified report

Descriptors: (*Tanks (Combat vehicles), Detection), (*Acoustic detectors, Performance (Engineering)), Sensitivity, Personnel, Vehicles, Research program administration.

The objectives of this reporting period were to complete an analysis of present test data to determine the discriminator capabilities. A meeting with representatives of Picatinny Arsenal will then be held to determine future action under the contract. (Author)

AD-430 540 Div. 8
OTS price $2.60

Technical Services Lab., Picatinny Arsenal, Dover, N. J.
MAGNETIC FREQUENCY DIVIDER THEORETICAL CALCULATIONS FOR DESIGN OF INCREMENTAL COUNTERS,
by John Matt Chlupsa. Jan 64, 28p.
PA TM1304 1; TR19 64 Unclassified report

Descriptors: (*Frequency dividers, Semiconductor devices), (*Semiconductor devices, Pulse counters), (*Pulse counters, Frequency dividers), Transistors, Magnetic core storage, Miniature electronic equipment, Oscillators, Coils.

This report is concerned with the theory, design and development of solid-state, frequency-divider units. These frequency divider units store time, that is, they count the output pulses of an electronic timer's oscillator. (Author)

AD-430 549 Div. 8, 5
OTS price $21.00

Georgia Inst. of Tech., Engineering Experiment Station, Atlanta.
MANUSCRIPT OF CATALOGUE, VOLUME 9. A SECOND RADIO FREQUENCY INTERFERENCE BIBLIOGRAPHY, WITH ABSTRACTS. ELECTRONIC EQUIPMENT INTERFERENCE CHARACTERISTICS-COMMUNICATION TYPE,
by E. W. Wood and J. W. Rose. 1 Dec 63, 352p.
Contract DA36 039AMC02294E, Projs. 3B24 01 001, A678
Unclassified report

Descriptors: (*Radiofrequency interference, Bibliographies), (*Electronic equipment, Radiofrequency interference), (*Bibliographies, Radiofrequency interference), Abstracts, Pulse communication systems, Electromagnetic waves, Indexes.

This bibliography, with abstracts, is the result of a continued literature search being conducted in conjunction with the measurements portion on a research program for developing tests and test procedures for determining the interference characteristics of U. S. Army pulse type communications systems. The bibliography contains over 1150 titles, summaries, and abstracts of published works related to radio frequency interference and electromagnetic compatibility during the period from January 1960 to June 1963. The accumulated references from more than 50 sources should be useful in all phases of RFI investigations ranging from the practical elimination of TVI to the theoretical discussion of signal detection for various interference environments. An author index and a subject index containing 68 categories are included to aid the researcher in finding pertinent subject information. (Author)

AD-430 556 Div. 8, 26
OTS price $1.60

Friez Instrument Div., Bendix Corp., Baltimore, Md.
ML-419 THERMISTOR P. E. M.
Quarterly progress rept. no. 4, 1 Oct-31 Dec 63,
by J. T. George. 31 Dec 63, 18p.
Contract DA36 039AMC01465E
Unclassified report

Descriptors: (*Thermistors, Manufacturing methods), Production, Radiosondes, Processing, Clay, Mixtures, Electric wire, Attachment, Coatings, Machines, Test equipment, Reflection.

Efforts were continued on the establishment of a PEM, for ML-419 thermistors for radiosonde use. The following areas are discussed: Clay processing in mixing; Klin controlling system; Automatic lead wire attachment; Coating machinery; Reflectivity test equipment; and Experiments on exterior coatings for strength. (Author)

AD-430 563 Div. 8, 12
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
MANNED MILITARY SPACECRAFT DISPLAYS,
by J. R. Buyan. 31 Jan 64, 40p. Rept. no. TDR269 4540 30 1
Contract AF04 695 269
SSD TDR63 303 Unclassified report

Descriptors: (*Manned spacecraft, Display systems), (*Display systems, Manned spacecraft), Computers, Spaceborne, Electroluminescence, Cathode ray tubes, Performance (Engineering), Personnel, Tapes.

The state-of-the-art of manned spacecraft display systems is discussed with emphasis on how future display developments will effect spaceborne computer requirements. Considerable differences of opinion exist on how the spacecraft display subsystem should be evolved. The essential points of difference are whether time shared general purpose displays should replace the traditional maze of individual instruments and how and when man should enter into the control loop of the functions being displayed. The potential of both electroluminescent panels and cathode ray tubes as general purpose displays are discussed. At this time and in the near future only cathode ray tubes are capable of satisfying spaceborne general purpose display requirements. Three-dimensional displays, predictor instruments, and contact analog are eval-

uated as potential spaceborne displays. The display capabilities and philosophies of several companies are presented and some of their significant display projects are described. (Author)

AD-430 568 Div. 8, 30, 24
OTS price $3.60

Ohio State U. Research Foundation, Columbus.
NONDESTRUCTIVE SYSTEM FOR INSPECTION OF FIBER GLASS REINFORCED PLASTIC MISSILE CASES AND OTHER STRUCTURAL MATERIALS.
Quarterly status rept. no. 7, 29 Dec 62-28 Mar 63, by Jay P. Mitchell, Merle L. Rhoten and Robert C. McMaster. May 63, 33p.
Contract DA33 0190RD3670
WAL TR142 5 2 7 Unclassified report

Descriptors: (*Guided missile components, Cylindrical bodies), (*Cylindrical bodies, Glass textiles), (*Non-destructive testing, Guided missile components), Sensitivity, Television cameras, X-ray photography, Display systems, Scanning, Switching circuits, Radiography.

Advanced development work on X-ray television imaging systems was carried out to improve their sensitivity, performance, and to extend their usefulness by use of various storage media. X-ray imaging tests of a slow-scan television camera chain indicated that only 15 per cent of the X-radiation intensity required for the standard 30 frame per second camera chain was needed to produce comparative X-ray images at 1/4 frame per second. Tests of response to X-radiation of four X-ray-sensitive camera tubes having target thicknesses from 8 to 45 microns and using slow-scan operation, indicated that the tube having an 8-micron thickness of selenium target was most sensitive. Magnetic recording tests of slow-scan video signals have indicated that the technique was feasible, but that a clamping circuit was necessary to correct the playback video signal black-reference level. An electronic switching device was designed and constructed to provide more effective control of intermittent-scan operation of the standard television image enlargement system. The electronic switching device will be used in conjunction with the scan-converter storage system when it is delivered. (Author)

AD-430 570 Div. 8, 26
OTS price $2.60

Bomac Labs., Inc., Beverly, Mass.
BL-221 70 Gc MAGNETRON PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 9, 6 Aug-6 Nov 63, by Gary G. Riska. 6 Nov 63, 28p.
Contract DA36 039sc85974
Unclassified report

Descriptors: (*Magnetrons, Manufacturing methods), Production, Extremely high frequency, Tests, Anodes (Electron tubes), Machinery Electrolytic polishing, Cleaning, Vacuum apparatus, Electric potential, Cathodes (Electron tubes), Configuration, Storage, Specifications.

Efforts were continued on the establishment of a PEM for the BL-221 70Gc magnetron. Storage test data on previously manufactured tubes with Bomac facility hot hobbed and machined anodes was compiled. Electrolytic polishing and vacuum firing appears to provide adequate cleanliness of the anode to insure good tube performance. Additional work done with smaller anode bore-out diameter did not result in producing the desired effect in the peak anode voltage. New anode cathode design changes worked out, appeared adequate in resolving the peak anode voltage problem. Revisions in test specifications were made and put into effect. New tubes were built with modified anode-cathode dimensions resulting in an adequate solution of the peak anode voltage problem. (Author)

AD-430 597 Div. 8
OTS price $3.60

Illinois Univ., Urbana Engineering Experiment Station.
SYNCHRONIZATION OF DIGITAL SYSTEMS BY MEANS OF A TRANSISTORIZED TRANSMITTER DISTRIBUTOR,
by Richard A. Woerner. 20 Jan 64, 36p. Rept. no. TR22
Contract Nonr1834 02, Proj. 371 161
Unclassified report

Descriptors: (*Teletype systems, Multiple operation), (*Multiple operation, Teletype systems), (*Distribution, Synchronization (Electronics)), (*Synchronization (Electronics), Teletype systems), Computer logic, Gates (Circuits), Transistors, Printed circuits, Scalers, Oscillators, Power supplies, Data transmission systems, Digital systems.

The transmitter distributor is a general purpose transistorized data synchronizer. Therefore the system has the capabilities of synchronizing data transmission between a number of transmitting and receiving systems. The main function of the distributor is to control the flow of data between Teletype equipment and various digital systems. The transmitter distributor is capable of transferring up to 8 channels of parallel data when operating in direct parallel to parallel modes or parallel to serial modes. Only five channels of data can be transmitted in the serial to parallel modes since the present Teletype equipment transmits 5 data bits per word. The Teletype equipment governs the speed of data conversion. The present speeds are 60, 75, or 100 words/minute. Should other serial systems be employed that are faster than the Teletype equipment, or if faster Teletype systems are installed, the transmitter distributor will be capable of converting data at these faster speeds. The rate generator and monostable delays would be recalibrated to synchronize the speed of data transmission between input and output. (Author)

AD-430 736 Div. 8, 26
OTS price $5.60

National Cash Register Co., Dayton, Ohio.
FEASIBILITY INVESTIGATION OF CHEMICALLY SPRAYED THIN FILM PHOTOVOLTAIC CONVERTERS.
Technical rept. for 1 Feb-31 Oct 63, by R. R. Chamberlin and J. S. Skarman. 31 Oct 63, 55p.
Contract AF33 657 7919, Proj. 8173, Task 817301
ASD TDR63 223, pt. 2 Unclassified report

Descriptors: (*Solar cells, Semiconducting films), (*Semiconducting films, Manufacturing methods), (*Manufacturing methods, Production), Electric potential, Electric current, Cadmium alloys, Sulfur compounds, Heat treatment, Life expectancy, Temperature, Copper alloys, Physical properties, Electrical properties, Configuration, Power, Indium alloys, Sprays, Chemicals, Glass, Silicon, Tellurium alloys, Electroplating.

The objectives of this phase were (1) to improve the characteristics of chemically sprayed, large area, thin film solar cells from the standpoint of efficiency, weight and lifetime, and (2) to fabricate for delivery a one-foot square photovoltaic array. Research during the second phase

was primarily directed to extending this feasibility of material and process to the fabrication of a solar cell using metal foil as a substrate. This research also covered the demonstration of heterogeneous junction photovoltaic effect using chemically sprayed films with Si, CdTe, and GaP. One photovoltaic thin film CdS array one-foot square was fabricated for delivery. The array which was composed of nine cells, each approximately four inches square, had an efficiency of .03%. This efficiency does not indicate the potential of the process since single four inch square cells were made with .3% efficiency and one inch square cells with an efficiency of 1.2%. (Author)

AD-430 775 Div. 8
OTS price $2.60

Norwegian Defence Research Establishment.
NON-LINEAR OSCILLATIONS IN TUNNEL DIODES,
by L. O. Svaasand. 16 Apr 63, 28p.
Contract AF61 052 484
NDRE TN8; AFCRL 64 21 Unclassified report

Descriptors: (*Tunnel diodes, Oscillators), (*Oscillators, Tunnel diodes) Polynomials, Differential equations, Non linear differential equations, Stability, Capacitance, Electric potential, Electric currents, Harmonic analysis.

The high frequency operation of a tunnel diode oscillator has been studied through approximative analytical solutions of the characteristic non-linear differential equation of the oscillator. Special attention has been given to the case of quasi-harmonic oscillations. For this certain characteristic phenomena of non-linear resistance oscillators, such as amplitude quenching and hard oscillations, are shown to exist. (Author)

AD-430 804 Div. 8
OTS price $9.60

American Electronic Labs., Inc., Colmar, Pa.
INTERFERENCE REDUCTION FEASIBILITY STUDY.
Final progress rept. 15 July 63,
by John Waitkeneus. 15 July 63, 113p.
Contract NObsr87470, Projs. SF01301504, AEL62053
Unclassified report

Descriptors: (*Radiofrequency interference, Reduction), (*Radio receivers, Ultrahigh frequency), (*Reduction, Radiofrequency interference), (*Ultrahigh frequency, Radio receivers), Sensitivity, Helixes, Resonators, Multiple operation, Bandwidth, Tuned circuits, Coupling circuits, Crystal filters, Gain, Feasibility studies.

This is a final report covering an interference reduction feasibility study to determine techniques that could permit co-channel and/or adjacent channel UHF receiver operation in an intense pulsed-interference environment. (Author)

AD-430 859 Div. 8
OTS price $2.60

Astron Corp., East Newark, N. J.
PRODUCTION ENGINEERING MEASURE FOR CAPACITOR, VAPORIZED TEFLON, METALLIZED.
Quarterly rept. no. 4, 1 Oct-31 Dec 63,
by John G. Froemel. 31 Dec 63, 22p.
Contract DA3 039AMC01459E
Unclassified report

Descriptors: (*Capacitors, Manufacturing methods), (*Manufacturing methods, Production), Halocarbon plastics, Metal films, Aluminum, Vaporization, Specifications, Electrical properties, Glow discharges.

This report describes work done on the project 'Capacitor, Vaporized Teflon, Metallized Glow-Discharged, Deposited Dielectric Film' which is directed toward preparing glow-discharged capacitors. During this period a number of capacitors were wound and the results are reported. The 'Glofilm' material used required further work to bring it up to capacitor grade. (Author)

AD-430 898 Div. 8, 32
OTS price $3.60

System Development Corp., Santa Monica, Calif.
MATRIX APPLICATIONS TO VIBRATION PROBLEMS AND ELECTRICAL NETWORKS,
by John Staudhammer. 21 Nov 63, 38p. Rept. no. SP1471
Unclassified report

Presented at the Department of Electrical Engineering, University of Houston on 10 Apr 63, Houston, Texas.

Descriptors: (*Electrical networks, Theory), (*Linear systems, Operational calculus, (*Vibration, Matrix calculus), Complex variables, Motion, Circuits, Management engineering, Education.

This report reviews the present and future education of engineering students and reports that the availability of modern computing means has accelerated the use of matrix methods. It discusses matrix applications and shows how two totally dissimilar problems led to the same computational problem. Similar examples can be drawn from other fields of engineering. The ease with which the problems are handled is due to the advent of digital computing technology, and that in the future we shall see more use of these methods, even at the freshman level. Because of the ease with which tedious calculations can be accomplished, problems of large extent become feasible in engineering instruction. (Author)

AD-430 901 Div. 8
OTS price $2.50

General Electric Co., Auburn, N. Y.
THE RESEARCH AND DEVELOPMENT OF HIGH CURRENT AND HIGH VOLTAGE SILICON CONTROLLED RECTIFIERS.
Final rept., 30 June 62-31 Dec 63.
31 Dec 63, 111p.
Contract NObsr87648, Proj. SF013 11 05
Unclassified report

Descriptors: (*Crystal rectifiers, Electronic switches), (*Semiconductor devices, Electronic switches), (*Electronic switches, Semiconductor devices), Manufacturing methods, Silicon, Processing, Electric potential, Electric currents, Power, Time, Diffusion, Surface properties, Tests, Electrical properties.

Research concerned the development of high-current, high-voltage silicon controlled rectifiers. The design, development, optimization, fabrication and characterization of a 155 amp, 1300 volt device are described and discussed in detail, along with a description of process steps and component parts. (Author)

AD-430 959 Div. 8
OTS price $4.60

National Security Agency, Fort George G. Meade, Md.
Q AND BANDWIDTH OF STRIPLINE,
by Arthur D. Sills. Oct 63, 41p.
NSA TM R51 41 Unclassified report

Descriptors: (*Transmission lines, Bandwidth), (*Bandwidth, Transmission lines), Electrical impedance, Resonance, Theory, Superhigh frequency, Programming (Computers), Standing wave ratios, Measurement, Electric potential, Mathematical analysis, Test methods.

Conditions for resonance of transmission line structures are derived in terms of the line propagation parameters, line length, and its associated generator and terminating impedances. These conditions are expressed in terms of parallel impedance at resonance and the equivalent Q such as is conventional practice for resonant lumped circuits. Assumption of a relatively low loss line yields a simple closed form expression for the resonance curve and the relationship that the overall attenuations factor is one-half the width of the resonance curve at the half-power points. The theory was applied to predict the unloaded Q's of a series of six stripline filters in the 5 to 8 kmc range. Calculations were made using a FORTRAN computer program yielding Q's of the order of 400. VSWR measurements on the filters open circuited and terminated were also made and connected to unloaded Q values. Agreement between prediction and measurements was excellent. (Author)

AD-430 960 Div. 8
OTS price $4.60

National Security Agency, Fort George G. Meade, Md.
STRIPLINE COUPLING,
by Arthur D. Sills. Aug 63, 49p.
NSA TM R51 39 Unclassified report

Descriptors: (*Transmission lines, Coupling circuits), (*Coupling circuits, Transmission lines), Matrix algebra, Electrical impedance, Measurement, Admittance, Theory, Electric fields, Test methods, Programming (Computers), Mathematical analysis.

Stripline Directional Couplers are described in terms of an impedance matrix. The terms appearing in the matrix are functions of the odd mode impedance Zoo and the even mode impedance Zoe as well as the electrical length theta. Zoo and Zoe are determined through the use of conformal mapping techniques. Results are presented in graphical form. Experimental evidence indicates good correlation between theory and measurement. (Author)

AD-430 986 Div. 8
OTS price $4.60

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
NARROW-BAND TUNNEL-DIODE SUPERREGENERATIVE AMPLIFIERS,
by William H. Jackson, Jr. Sep 63, 39p. Rept. no. TM183
Contract AF33 657 7644, Proj. DSR9040, Task 414409
Unclassified report

Descriptors: (*Radiofrequency amplifiers, Tunnel diodes), (*Tunnel diodes, Radiofrequency amplifiers), Bandwidth, Radar receivers, Superregeneration, Tuned circuits, Gain, Mathematical analysis, Noise (Radio), Radio receivers, Amplitude modulation, Design, Narrowband.

An evaluation of tunnel-diode superregenerative amplifier circuits using two non-sinusoidal quench waveforms is presented. It was found that a 3-db noise-to-information bandwidth ratio of 2 to 1 in an aplifier of 60-db gain can be achieved using a sawtooth-like quench waveform; this represents a substantial improvement over results obtained by others using the conventional sinusoidal quench waveform. A selective review of existing superregenerative amplifier theory is presented, and effects on amplifier performance of various quench waveforms are discussed. (Author)

AD-431 000 Div. 8, 24
OTS price $8.60

General Electric Co., Syracuse, N. Y.
ELECTRON BEAM ON FILM RECORDER.
Interim technical rept. no. 2, 21 Sep 63-24 Jan 64,
by W. R. Chynoweth, D. R. Cunningham, C. E. Cady, A. W. Edson and B. A. Findeisen. Jan 64, 99p.
Contract AF33 657 11407
Unclassified report

Descriptors: (*Photographic recording systems, Electron beams), (*Electron beams, Photographic recording systems), Cathode ray tubes, Electron guns, Electromagnets, Deflection, Frequency multipliers, Pulse generators, Sweep generators, Radiofrequency amplifiers, Modulators, Power supplies, Test methods, Detectors, Circuits, Resolution, Transistors.

The object of this program is to develop a wide band direct electron beam on film recorder with 20 Mc bandwidth for use on 5 in. film. During this report period a sealed off UHR-CRT, the interim demountable gun, test stand and most of the electronics were completed. Feasibility of using a Pierce emission system with the prototype UHR electron optics was demonstrated. A transport design was evolved and construction started. System integration and test is ready to start. Initial system operation will involve the test stand and interim electron gun. (Author)

AD-431 001 Div. 8, 24
OTS price $7.60

General Electric Co., Syracuse, N. Y.
ELECTRON BEAM ON FILM RECORDER.
Interim technical rept. no. 1, 1 June-20 Sep 63,
by W. R. Chynoweth, D. R. Cunningham, C. E. Cady, A. W. Edson and A. W. Hartman. Sep 63, 76p.
Contract AF33 657 11407
Unclassified report

Descriptors: (*Photographic recording systems, Electron beams), (*Electron beams, Photographic recording systems), Bandwidth, Electron guns, Deflection, Vacuum apparatus, Tungsten, Resolution, Video amplifiers, Modulation, Circuits, Cathode ray tubes, Manufacturing methods, Transistors.

The object of this program is to develop a wide band direct electron beam on film recorder with 20 Mc bandwidth for use on 5 inch wide film. This report period was devoted to work on electron guns, electronic circuits, a vacuum test stand, and system analysis. Parts were fabricated for a demountable electron gun with a tungsten filament and for a sealed-off version, both based upon a ultra-high resolution wide sweep proto-

type. Sweep circuits for 600 to 3750 sweep per second and a video amplifier of 20 Mc bandwidth were constructed. Fabrication of a vacuum test stand was started. A partial analysis of the modulation transfer characteristic of the system was performed. (Author)

AD-431 017 Div. 8
OTS pricr $5.60

Remington Rand Univac Div., Sperry Rand Corp., Philadelphia, Pa.
SYNTHESIS OF LOGIC FUNCTIONS ON AN ARRAY OF INTEGRATED CIRCUITS,
by L. M. Spandorfer and J. V. Murphy. 31 Oct 63, 56p. Scientific rept. no. 1
Contract AF19 628 2907, Proj. 4645, Task 464504
AFCRL 63 528 Unclassified report

Descriptors: (*Integrated circuits, Gates (Circuits)), (*Gates (Circuits), Integrated circuits), (*Microminiaturization (Electronics), Gates (Circuits)), Synthesis, Computer logic, Semiconductor devices, Semiconductor films, Models (Simulations), Switching circuits, Production, Relaxation oscillators, Sandwich construction, Theory.

The problem is considered of synthesizing large-scale logic on an array of microcircuits with particular attention to topological aspects arising from the interconnection and crossover problems. The results are applicable to semiconductor, thin-film, and hybrid microcircuits. A model is described and assumptions delineated. A theorem is presented which shows that all switching functions can be synthesized by means of a collection of logic elements and interconnecting paths in a manner such that no logic paths intersect or cross over one another. Specific techniques are presented for synthesizing functions in planar, i.e., crossoverless, form. A divergent approach is taken where algorithms are given for synthesizing any logic function on at most two layers of interconnections. The assumptions are: (1) that any logic element can be connected only to its neighbors in the array and (2) that each interconnecting line, or path, can be assigned to either layer 1 or layer 2 by means of a very simple rule. A study is also presented of the algorithms can be modified to handle faulty logic elements, thus establishing a re-routing capability. (Author)

AD-431 041 Div. 8
OTS price $3.60

Microwave Associates Inc., Burlington, Mass.
INVESTIGATION OF HIGH POWER GASEOUS ELECTRONICS.
Quarterly progress rept. no. 4, 16 Aug-15 Nov 63, by H. S. Maddis, J. Gregory and C. S. Ward.
15 Nov 63, 34p.
Contract DA36 039AMC00097E, Task 1G6 22001A055 04
Unclassified report

Descriptors: (*Discharge tubes, Microwave frequency), (*Microwave frequency, Discharge tubes), Power, Neon, Quartz, Vacuum, Performance (Engineering), Temperature, Physical properties, Diffusion, Energy, Adsorption, Recovery.

Clean-up and thermal recovery of inert gases at the interface between a high-power microwave discharge and a quartz surface have been further investigated. Using representative gas samples, the square root clean-up rate was found to be independent of fill pressures in the .5 Torr to 5 Torr range. The square root clean-up rate was observed to increase linearly with the square root of the incident peak power. Neon was found to have an activation energy of 11.3 KCal/mole for diffusion in quartz. (Author)

AD-431 053 Div. 8
OTS price $3.60

Motorola, Inc., Phoenix, Ariz.
''HIGH SPEED SEMICONDUCTOR SWITCH (TWO TERMINAL) HIGH SPEED SEMICONDUCTOR SWITCH (GATE)''.
Quarterly rept. no. 2, 29 Aug-28 Nov 63.
28 Nov 63, 38p.
Contract DA36 039AMC01475e
Unclassified report

Descriptors: (*Electronic switches, Semiconductor devices), (*Semiconductor devices, Electronic switches), Silicon, Crystal rectifiers, Time, Radiofrequency pulses, Electric currents, Electric potential, Test equipment (Electronics), Tests, Resistance (Electrical), Diffusion, Life expectancy, Manufacturing methods, Metal coatings, Diodes (Semiconductors), Vapor plating, Transistors, Radar equipment, Modulators.

Research was continued on the development of high-speed semiconductor switches for use in radar modulator and similar pulse type applications. The proposed devices are of two varieties - the SCL 7004/1, a two-terminal, four layer unit and the SCL 7004/2, a three-terminal (gated) SCR. The essential areas of improvement are to be switching speeds at high current levels and forward voltage capabilities. Data on the first group of engineering samples and circuits used for testing are described. The progress made on resistivity, wafer thickness, die cutting, diffusion and lifetime studies is also presented, as well as work done on metalizing and assembly techniques. (Author)

AD-431 126 Div. 8, 18
OTS price $9.10

ITT Research Inst., Chicago, Ill.
STATE OF THE ART IN ELECTROMAGNETIC INTERFERENCE APPLIED TO PROBLEMS OF THE BUREAU OF YARDS AND DOCKS.
Final rept., phase 1, 1 June 59-31 May 60.
July 60, 103p.
Contract NBy24936, Proj. E120
Unclassified report

Descriptors: (*Interference, Electromagnetic waves), (*Electromagnetic waves, Interference), Radio waves, Radio signals, Analysis, Measurement, Design, Specifications, Instrumentations, Distribution, Military facilities, Naval shore establishments, Shielding.

To determine present and anticipated difficulties in carrying out the assigned responsibilities of the Bureau of Yards and Docks with respect to the control of electromagnetic interference, extensive interviews were conducted with Naval personnel and others. Facts and opinions obtained are summarized and analyzed, with resulting conclusions and recommendations in both administrative and technical areas. The conclusion is that the Bureau has a real problem in this area. Two major recommendations are administrative in nature; (a) One presents a minimally adequate program for effecting interference control, and (b) the other expresses a need for defining overall policy relative to levels of equipment suppression. Many other conclusions and recommendations are presented in this first phase of a three-phase study. (Author)

AD-431 129 Div. 8, 22
OTS price $3.60

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
A DESCRIPTION OF THE USE OF SEMICONDUCTOR

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

INTEGRATED CIRCUITS FOR ARTILLERY TIMERS AND OTHER ORDNANCE MATERIAL,
by Donald N. Shaw. Feb 64, 32p.
AED TM1355 Unclassified report

Descriptors: (*Integrated circuits, Timing devices), (*Timing devices, Integrated circuits), Fuzes (Ordnance), Timing circuits, Artillery, Digital systems, Time delay fuzes, Semiconductors, Electronic relays, Fuze setters, Ordnance.

The recent development of the Semiconductor Integrated Circuit as a possible milestone in the evolution of Timers and Programmers for Ordnance Materials is recognized. A prototype of a Digital Integrated Circuit Artillery Timer is described and cost considerations and performance objectives are compared with mechanical timers now used by the Army. (Author)

AD-431 183 Div. 8
OTS price $6.60

General Electric Co., Schenectady, N. Y.
ULTRA HIGH POWER TRANSMISSION LINE TECHNIQUES,
by J. P. Quine. Dec 63, 65p.
Contract AF30 602 2990, Proj. 5578, Task 557801
RADC TDR63 489 Unclassified report

Descriptors: (*Waveguides, Radiofrequency power), (*Radiofrequency power, Waveguides), (*Microwave equipment, Waveguides), Feasibility studies, Configuration, Ultrahigh frequency, Superhigh frequency, Waveguide bands, Waveguide couplers, Power dividers, Absorption, Theory, Impedance matching.

The purpose of this investigation is to develop systematic procedures for selecting optimum waveguide configurations and designing waveguide components that will operate at high levels of peak and average power in the frequency range 1-10 gigacycles. In particular, the feasibility will be investigated of designing compact components such as bends, couplers, power dividers, tapers, and mode absorbers in waveguides having cross section dimensions in the range 1.5 to 2.5 free space wavelengths. This report presents theoretical and experimental results for E and H-plane bends in oversized rectangular waveguide. The results of a theoretical study of directional couplers for oversized waveguide are also presented. (Author)

AD-431 185 Div. 8, 25
OTS price $3.60

Michigan U., Ann Arbor.
FUNDAMENTAL CONSIDERATIONS IN THE DESIGN OF AN AC ARC HEATER.
Interim technical rept.,
by Richard L. Phillips. Jan 64, 37p.
Contract AF33 657 8630, Proj. 7065, Task 7065 01
ARL 64 9 Unclassified report

Report on Aerospace Simulation Techniques Research.

Descriptors: (*Electric arcs, Alternating current), (*Heaters, Design), Electrodes, Circuits, Power, Inductance, Solenoids, Thermal diffusion, Heat transfer, Plasma jets.

Certain design criteria fundamental to the successful operation of an AC arc heater facility are discussed in some detail. An approximate model of a cooled metallic electrode which is being heated by a moving arc is analyzed allowing one to see what combination of parameters affects electrode lifetime. The behavior of a three-phase inductive circuit containing arcs is studied assuming a temporal square wave arc voltage variation. It is shown that predictions of power factor, maximum useful power, RMS current, etc., can be made if one knows only the ratio of the arc voltage to the peak line voltage. (Author)

9. FLUID MECHANICS

AD-429 352 Div. 9
OTS price $1.60

RAND Corp., Santa Monica, Calif.
MAGNETOHYDRODYNAMIC-HYPERSONIC VISCOUS FLOW NEAR THE STAGNATION POINT OF A BLUNT BODY,
by M. C. Smith and C. S. Wu. Jan 64, 10p. Rept. no. RM3970PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Hypersonic flow, Magnetohydrodynamics), (*Magnetohydrodynamics, Blunt bodies), Numerical methods and procedures, Stagnation point, Shock waves, Magnetic fields, Reynolds number, Equations, Electrical conductance, Viscosity.

The equations governing the hypersonic flow about a magnetized body are solved numerically. The solutions obtained illustrate the effects of Reynolds number and magnetic parameter on the structure of the applied magnetic field. The results show that, for magnetic parameters larger than a critical value, numerical solutions do not exist. A critical magnetic parameter is considered to result from an assumption of a given magnetic field at the shock. By increasing the conductivity, and thereby the induced magnetic field, the applied field at the shock disappears. This in turn violates the basic assumption of a finite field at the shock. It is concluded that the applied magnetic field can be defined only at the body where it is a natural characteristic of the problem. (Author)

AD-429 469 Div. 9, 30
OTS price $15.00

Ordnance Research Lab., Pennsylvania State U., University Park.
TUNNEL WALL INTERFERENCE EFFECTS ON THE DRAG AND PITCHING MOMENT OF AN AXISYMMETRIC BODY,
by T. E. Peirce. 14 Jan 64, 211p. TM501 8871 02
Contract NOw63 0209c
Unclassified report

Descriptors: (*Wind tunnels, Interference), (*Water tunnels, Interference), Drag, Pitch (Motion), Wind tunnel models, Wind tunnel nozzles, Errors, Mathematical prediction, Bodies of revolution, Slender bodies, Theory, Instrumentation, Wire, Torpedo models, Submarine models, Three-dimensional flow, Axially symmetric flow.

A method is developed for the prediction of the interference effects of a wind or water tunnel wall on the drag and pitching moment of a three dimensional model. The investigation is divided into two parts. The first part develops a theory for the prediction of the effect of tunnel wall deviations on the drag of the model, while the second part develops a theory for the effect of the tunnel wall on the pitching moment of the model. In determining the effects of tunnel wall deviations on model drag, the investigation is limited to a non-viscous fluid, potential flow, and an axisymmetric deviation. A small deviation is first considered and the magnitude of interference effect is found to be proportional to the thickness of the deviation and the cube of the distance from the deviation. A method is also developed which can be used to determine the interference effect of any size deviation. This second method is used to determine the effect the tunnel nozzle has on the measured drag of a model. (Author)

AD-429 506 Div. 9, 25
OTS price $1.10

Innsbruck U. (Austria).
PRESSURE HILL AND THE ADIABATIC ELLIPSE IN MAGNETOGASDYNAMICS,
by F. Cap and R. Skarics. 25 July 63, 9p. TN3
Contract AF61 052 675
Unclassified report

Descriptors: (*Magnetohydrodynamics, Gas flow), Plasma physics, Adiabatic gas flow, Magnetic fields, Pressure, Velocity, Mathematical analysis.

On the basis of Bernoulli's equations for a potential flow in magneto-gasdynamics, a modified Saint-Venant - Wantzel formula of efflux is derived. Pressure as a function of the velocity of effluc is calculated for magnetic field strengths of 0, 5 000, and 10 000 Gauss. The equation of a modified adiabatic ellipse is deduced with the aid of an auxiliary quantity for calculation, closely basing on gas dynamics. Furthermore, expressions interrelating the flow velocity, the modified Mach number, and the modified critical Mach number are studied. (Author)

AD-429 509 Div. 9
OTS price $4.60

Stanford U., Calif.
CAVITY FLOW AROUND CAMBERED HYDROFOILS,
by Ahmed El. Nimr and Byrne Perry. Sep 63, 40 p. Rept. no. TR17
Contract Nonr22556, Proj. SR009 01 01
Unclassified report

Descriptors: (*Hydrofoils, Cavitation), Hydrodynamics, Angle of attack, Fluid flow, Velocity, Lift, Drag, Equations, Camber, Liquids.

An analytical study is made of the flow past hydrofoils with large camber at arbitrary angles of attack. The class of hydrofoils considered is restricted to those whose hodograph plane has a shape very near that bounded by two circular arcs. Under this assumption a general method is derived to calculate the parameters of the flow. In addition, a short-cut procedure is introduced for estimating the lift and drag coefficients. As a numerical example to illustrate the theory the flow past a circular-arc foil is considered. The force coefficients are in good agreement with the values computed by Rosenhead. (Author)

AD-429 767 Div. 9, 31
OTS price $5.60

Hydronautics Inc., Laurel, Md.
MINIMUM WAVE RESISTANCE OF BULBOUS SHIPS,
by B. Yim. Oct 63, 36p. TR117 3
Contract Nonr3349 00, Proj. NR062 266
Unclassified report

Descriptors: (*Ships (Non-military), Water waves), Ship hulls, Theory, Distribution, Analysis, Velocity, Ocean waves, Viscosity, Propellers (Marine), Polynomials, Volume, Equations, Experimental data.

AD-429 780 Div. 9
OTS price $5.60

Centre National D'etudes ET DE Recherches Aeronautiques (Brussels).
LAMINAR SEPARATION IN SUPERSONIC FLOW.
Final rept., 1 Nov 62-30 Sep 63,
by Jean J. Ginoux. 30 Sep 63, 59p.
Grant AF EOAR63 45
AFOSR 64 0122 Unclassified report

Descriptors: (*Delta wings, Supersonic characteristics), (*Supersonic flow, Delta wings), (*Laminar flow, Separation), Flat plate models, Three-dimensional flow, Vortices, Laminar boundary layer, Stability, Boundary layer control, Leading edge, Heat transfer, Swept-back wings, Wedges, Pressure.

A study of three-dimensional flow perturbations in laminar supersonic flows was made on flat plates with sweptback leading edges and in the reattachment region of the flow over flat plates with backward-facing steps. It was shown that a cross-flow existed in the boundary layer on flat plates with supersonic sweptback leading edges of small bluntness, which increased in magnitude from the centerline towards the sides of the models. In separated flows, only an extremely small amount of cross-flow was needed to destabilize the flow and to create regular spanwise variations in total pressure. Larger cross-flows, controlled by a systematic variation of the angle of sweep either of the leading edge or of the edge of the step, had no further effect. Detailed surveys made in a reattaching laminar supersonic flow with a static probe showed that the three-dimensional perturbations that existed in the boundary layer were formed by two layers of equidistant contra-rotating streamwise vortices: one located near the wall and a second one near the outer edge of the boundary layer. (Author)

AD-429 792 Div. 9, 6
OTS price $1.60

Electro-Optical Systems, Inc., Pasadena, Calif.
SOME BASE FLOW CLOSURE ANGLE RESULTS FOR CONES IN FREE FLIGHT,
by Hartley H. King. Jan 64, 10p. Research note no. 21
Unclassified report

Descriptors: (*Base flow, Conical bodies), (*Atmosphere entry, Base flow), (*Boundary layer, Separation), Supersonic flow, Wind tunnel models, Photographs, Wake, Laminar flow, Optical properties, Ranges (Establishments), Shear stresses.

Base flow closure angle data were obtained from ballistics range and wind tunnel photographs of cones in free flight at low supersonic Mach numbers. These data were compared with laminar theory using the Chapman separated flow model and its recent extensions which take into account the structure of the initial profiles at the separation point. The ballistics range data were in good agreement with the theory which included the effect of the distortion of the boundary layer profiles due to flow turning at the separation point. This suggests that details of the structure of the initial separated shear layer profiles may be quite important in determining the overall properties of the base flow region. (Author)

AD-429 801 Div. 9, 31
OTS price $.75

Stevens Inst. of Tech., Hoboken, N. J.
SUMMARY OF INVESTIGATION OF MIDSHIP BENDING MOMENTS EXPERIENCED BY MODELS IN EXTREME REGULAR WAVES.
Final rept.,
by John F. Dalzell. 18 Dec 63, 16p.
Contract NObs88509, Proj. SR157
SSC 157 Unclassified report

Report on Model in Extreme Waves.

Descriptors: (*Ship models, Moments), Statistical analysis, Ocean waves, Moments.

A physical upper limit on midship bending moments being reached in regular waves of height significantly less than the theoretical upper limit of stability for progressive waves is investigated. The experiment included variation of ship type, of distribution of loading and of freeboard as model parameters. The ship types investigated were a modern cargo vessel, a large tanker, and a modern destroyer. Each model was tested at various speeds in regular head and following waves of several different lengths and of a wide range of heights. No significant upper limit of bending moment was found. However, the study establishes the grossly linear dependence of midship bending moment on wave height, even for extreme wave heights which may be encountered in service. These findings strengthened the case for determining design wave bending moments on the basis of statistical analysis of ocean waves and/or resulting bending moments. (Author)

AD-429 808 Div. 9
OTS price $3.60

Avco Everett Research Lab., Everett, Mass.
EFFECTS OF NONEQUILIBRIUM ON THE HYPERSONIC LAMINAR BOUNDARY LAYER,
by P. DeRienzo, F. Berner, A. D. Wood and J. D. Teare. Sep 63, 29p. RR171, RAD TM64 2
Contract AF04 694 33, AF04 694 239
BSD TDR63 210 Unclassified report

Descriptors: (*Laminar boundary layer, Slender bodies), (*Hypersonic flow, Reentry vehicles), Atmosphere entry, Conical bodies, Enthalpy, Velocity, Diffusion, Chemical reactions, Equations of state, Integrals, Integrations, Compressible flow, Numerical methods & procedures, Heat transfer, Relaxation time, Frozen equilibrium flow.

An approximate method is formulated for the determination of the non-equilibrium compressible laminar boundary layer, both with and without the restriction of vibrational equilibrium. The method involves solution of the rate equations for species production and vibrational relaxation along effective particle paths determined from mass continuity considerations. The velocity and enthalpy time histories along these paths are then specified from the appropriate locally simialr equilibrium or frozen boundary layer analysis. Application of the method is illustrated for the hypersonic laminar boundary layer along a sharp cone. Results are compared with more exact numerical solutions of the nonequilibrium boundary layer equations, and the limitations of the approximate method are indicated. Finally, the technique is used to determine the effects of altitude and cone angle on the nonequilibrium boundary layer, together with the influence of variations in the chemical rate constants and vibrational relaxation models. The application of binary scaling is discussed. (Author)

AD-429 811 Div. 9
OTS price $3.60

Israel Inst. of Tech. (Haifa).
MEASUREMENT OF LAMINAR HEAT TRANSFER RATES OVER A TWO DIMENSIONAL BACKWARD FACING STEP IN A SHOCK TUBE,
by J. Rom and A. Seginer. Feb 63, 33p. TN3, TAE Rept. no. 25
Contract AF61 052 576
ARL 63 99 Unclassified report

Descriptors: (*Wedges, Heat transfer), Aerodynamic configurations, Blunt bodies, Model tests, Wind tunnel models, Laminar flow, Separation, Aerodynamic characteristics, Flat plate models, Shock tubes, Supersonic flow, Aerodynamic heating, Supersonic characteristics, Shock wave, Attachment.

Heat transfer rates are measured over a two dimensional backward facing step in a laminar supersonic flow in the shock tube. The shock Mach numbers range between 4 and 10, the corresponding flow Mach numbers are approximately 1.5 to 2.5 and the Reynolds numbers per cm. range between 2x10 to the third power to 2x10 to the fifth power. High heat transfer rates are measured in the reattachment zone. The heat transfer rate there is found to increase rapidly with increasing Reynolds numbers. The total heat transfer rate to the separated region is thus greater than that for the attached flat plate laminar case for Re sub L greater than 2x10 to the fourth power. (Author)

AD-429 812 Div. 9
OTS price $3.60

Israel Inst. of Tech. (Haifa).
CORRELATION OF THE BASE-PRESSURE BEHIND A TWO DIMENSIONAL BACKWARD FACING STEP IN A LAMINAR SUPERSONIC FLOW,
by J. Rom and M. Victor. Dec 62, 36p. TN no. 2, TAE Rept. no. 23
Contract AF61 052 576
ARL 63 89 Unclassified report

Descriptors: (*Base flow, Separation), Wind tunnel models, Supersonic flow, Laminar flow, Theory, Distribution, Data, Pressure, Two-dimensional flow.

Pressure distribution over two-dimensional backward-facing step models is measured at Mach 2.25 and 3.55. The Reynolds numbers (based on flat plate length L) in these tests vary between 0.5x10 to the fifth power and 5x10 to the fifth power. In the laminar flow case, the base pressure was found to correlate with the single parameter delta X sub sh/L in accordance with the base flow theory which is based on the Crocco-Lees mixing concepts. The mixing parameter C is found to be approximately 15 when the mixing region thickness is defined at u/u sub e =0.95. This value for C agrees with the mixing parameter value found in the shock wave-laminar boundary layer case by Glick. This result supports the a priori assumption of the mixing theory that the mixing parameter C be independent of external flow Mach number and Reynolds number. (Author)

AD-429 873 Div. 9, 31
OTS price $16.00

Pacific Missile Range, Point Mugu, Calif.
STEADY-STATE MOTION OF CABLES IN FLUIDS. PART 2. TABLES OF CABLE FUNCTIONS FOR VERTICAL PLANE MOTION,
by R. W. Claassen and C. J. Thorne. 15 Aug 63, 499p.
PMR TM63 9 Unclassified report

Descriptors: (*Tables, Handbooks), (*Towing cables, Functions), (*Fluids, Motion), Equations, Stresses.

The tables in this report make possible simple slide-rule or desk calculator calculations of position, stress, length, physical parameters, etc., in certain steady-state problems of the plane motion of cables. Part 1 of this study, NAVWEPS Report 7015 (Naval Ordnance Test Station (NOTS) Technical Publication 2378), discussed the problem for neutrally buoyant cables. The present report is for cables in a vertical plane and includes the effects due to weight of the cable. (Author)

AD-429 926 Div. 9
OTS price $4.50

Naval Weapons Lab., Dahlgren, Va.
VISCOUS FLUID MOTIONS AROUND DIHEDRAL ANGLES,
by Ernst W. Schwiderski and Hans J. Lugt. Dec 63, 45p.
NWL 1901 Unclassified report

Descriptors: (*Dihedral angles, Laminar flow), Wedges, Flate plate models, Equations, Fluid flow, Viscosity, Gas flow, Fluid dynamic properties, Motion.

General wedge and corner problems lead to the introduction of complex Navier-Stokes equations of complex laminar motions the real parts of which describe real laminar flows. Under the nonslip condition at the surface of a dihedral angle, the general solution of the complex Navier-Stokes equations is established on the basis of the corresponding integral of the Stokes equations of slow motions. The latter integration is accomplished in terms of slow-motion eigenfunctions with real eigenvalues for infinite and semi-infinite plates and with complex eigenvalues for wedges and corners. The results obtained render valuable information about the flow properties at the leading or trailing edge of a dihedral angle. In particular, laminar flows around dihedral angles are shown to be nonanalytic in their dependence upon the corresponding wedge or corner angles. (Author)

AD-429 931 Div. 9
OTS price $5.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
HEAT-TRANSFER AND SHADOWGRAPH TESTS OF SEVERAL ELLIPTICAL LIFTING BODIES AT MACH 10,
by M. E. Hillsamer and J. P. Rhudy. Feb 64, 51p.
Contract AF40 600 1000, Task 136607
AEDC TDR64 19 Unclassified report

Descriptors: (*Reentry vehicles, Lift), Nose cones, Aerodynamic heating, Heat transfer, Ellipsoids, Blunt bodies, Schlieren photographs, Wind tunnel models, Model tests, Instrumentation, Thermocouples, Aerodynamic configurations, Hypersonic characteristics, Shock waves, Spark shadowgraph photography.

Heat transfer and shadowgraph tests were conducted on several lifting bodies of elliptical cross section and sharp- and blunt-nose shapes to determine heat-transfer distributions and shock wave shapes around the various configurations. The tests were conducted at a nominal Mach number of 10 and free-stream unit Reynolds numbers of 0.31, 1.00, and 2.38 million per foot over an angle-of-attack range from 0 to 60 deg. Selected results of the tests presented in this report indicate slight increases in heat-transfer coefficient caused by increased Reynolds number and nose bluntness. Regions of flow separation are also shown on the leeward side of the models at pitch angles of 15 deg. and above. (Author)

AD-429 999 Div. 9
OTS price $4.60

Laboratoire de physiologie Acoustique, Jouy-en-Josas (Seine-et-Oise) (France).
CAVITATION PHENOMENA IN LIQUIDS SUBJECTED TO

Division 9 - FLUID MECHANICS

ULTRASONIC WAVES.
Final technical rept., 28 Apr 59-4 June 63,
by Maurice Degrois. Jan 64, 45p.
Contract N62 558 3567
Unclassified report

Descriptors: (*Cavitation, Phase studies), (*Ultrasonic radiation, Cavitation), Vibration, Bubbles, Cavitation noise, Temperature, Time, Solutions, Luminescence, Absorption, Optical phenomena, Liquids, Ultrasonic radiation, Nucleate boiling.

When a solution is subjected to a constant ultrasonic energy at a frequency of 1 Mc, two distinct states are observed. The cavitation phenomena include the vibration of the formed bubbles, the absorption of ultrasonic energy, the cavitation noise, temperature, etc. The influence of ultrasonic power, temperature, concentration and volume of solutions on the appearance of the phenomenon and the duration of the two states was determined. The chemical effects and luminescence resulting from the cavitation were also investigated, and it was noted that they are nil in one of the two states. Based on experimental results, a hypothesis was advanced suggesting that the alternating phenomenon of the two states amounts to the relaxation of gaseous and vaporous cavitations. A mathematical expression of the two durations is then proposed. (Author)

AD-430 014 Div. 9, 1
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE THERMAL BARRIER,
by N. Zhovinskiy. 3 Jan 64, 13p.
FTD TT63 976 Unclassified report

Trans. from Krylya Rodiny, no. 7, pp. 11-13, 1957.

Descriptors: (*Aerodynamic heating, Supersonic planes), Velocity, Time, Airspeed, Materials, High altitude, Cooling, Atmospheric temperature, Temperature, Air cooled, Jet propulsion.

AD-430 031 Div. 9, 25
OTS price $2.60

Fluid Mechanics Lab., Mass. Inst. of Tech., Cambridge.
STAGNATION POINT HEATING IN IONIZED MONATOMIC GASES,
by James P. Reilly. June 63, 27p. Publication no. 641
Grant AFOSR62 329
AFOSR 5442 Unclassified report

Descriptors: (*Gas ionization, Transport properties), (*Heat transfer, Gases), (*Stagnation point, Heating), Cylindrical bodies, Thermal conductivity, Argon, Xenon, Test equipment, Transport properties, Cooling, Temperature, Thermodynamics, Measurement, Diffusion.

The measurements made of the heat transfer to the stagnation point of a cylinder in partially ionized monatomic gases, and assesses the effect of free electrons on the total gas thermal conductivity are reported. Shock-heated argon and xenon were used as the test media, thus bypassing the dissociation phase present in diatomic gas heat transfer, and passing directly from the ideal gas to the ionized gas. Comparison of the experimental data is made with two real-gas estimates, the first including the effects of ionization only on the thermodynamic properties involved, and a second including the effects of ionization on both the thermodynamic and transport properties. The experimental results are in substantial agreement with the latter prediction where equilibrium is attained, and confirms the prediction of an increased gas thermal conductivity due to the presence of free electrons. An estimate of the contribution of radiative heating is made both numerically and experimentally, and found to be less than 10% of the aerodynamic heating for the test conditions. The test gas is shown to be in thermochemical equilibrium under those conditions where ionization is significant. (Author)

AD-430 045 Div. 9
OTS price $9.60

Stanford U., Calif.
A NONLINEAR THEORY FOR SUPERCAVITATING FLOW PAST A WEDGE IN A LONGITUDINAL GRAVITY FIELD,
by Charles W. Lenau. Oct 63, 112p. Technical rept. no. 28
Contract Nonr22556, Proj. S R009 01 01
Unclassified report

Report on Fundamental Hydromechanics Research Program.

Descriptors: (*Cavitation, Wedge), Gravity, Fluid dynamic properties, Fluid flow, Nonlinear systems, Mathematical models, Conformal mapping, Reflection, Integral equations, Numerical analysis, Drag, Theory.

An analysis is made of the effect of a longitudinal gravity field on two-dimensional supercavitating flow past wedges. Under the assumption that the flow is both irrotational and incompressible, a nonlinear theory is developed for steady flow. A closed, finite cavity model is used. By utilizing the methods of conformal mapping in combination with the Schwarz reflection principle, the mathematical problem is reduced to a three-parameter, nonlinear integral equation with one constraint. The integral equation is derived by reflecting the flow about the rigid boundaries, and the constraint is obtained by requiring the net singularity strength inside the cavity and wedge system to be zero. A successive-approximation procedure has been devised to obtain a numerical solution of the integral equation. Typical results for the drag-coefficient and cavity dimensions as functions of cavitation and Froude numbers are presented in graphs and tables, and a comparison is made between the linear theory of Acosta and the present work. Finally, the existence and uniqueness of the solution are discussed. (Author)

AD-430 091 Div. 9, 31
OTS price $3.60

Southwest Research Inst., San Antonio, Tex.
AN EXPERIMENTAL INVESTIGATION OF FLUTTER OF A FULLY SUBMERGED SUBCAVITATING HYDROFOIL,
by H. Norman Abramson and Guido E. Ransleben, Jr.
15 Dec 63, 31p. Technical rept. no. 4
Contract Nonr3335 00, SwRI Proj. 38 1028 2
Unclassified report

Descriptors: (*Hydrofoils, Flutter), Model tests, Hydrodynamics, Fluid flow, Oscillation, Deflection, Torque, Stresses, Failure (Mechanics), Two-dimensional flow, Three-dimensional flow, Mathematical analysis, Test methods.

Experimental results are reported of an investigation of the flutter characteristics of a fully submerged subcavitating hydrofoil. The foil suffered a catastrophic flutter failure at a

speed of approximately 48 knots. Comparisons are made with various prediction methods, neither the two-dimensional nor the three-dimensional theoretical calculations yielding results of the correct order of magnitude. Calculations employing measured three-dimensional oscillatory coefficients give a highly conservative prediction for flutter speed. (Author)

AD-430 100 Div. 9
OTS price $3.60

General Electric Co., Philadelphia, Pa.
HIGH VELOCITY RATIO NEAR FREE MOLECULAR FLOW,
by J. Enoch and N. Macri. 12 Feb 64, 39p. Document no. 64SD489
Contract AF04 694 222
Unclassified report

Report on Advanced Re-entry Programs.

Descriptors: (*Gas flow, Molecules); Superaerodynamics, Mathematical models, Drag, Lift, Energy conversion, Aerodynamic characteristics, Kinetic theory.

The problem of high velocity ratio near free molecular flow past a narrow strip is studied from the point of view of a previously developed kinetic model. The finite strip problem is approximated by the infinite strip problem. The logarithmic divergences arising in the infinite strip problem are handled by means of a cutoff procedure which is discussed in detail. Extensive numerical calculations of all the relevant aerodynamic quantities are presented. (Author)

AD-430 120 Div. 9
OTS price $10.10

Stanford U., Calif.
AN ANALYTICAL AND EXPERIMENTAL STUDY OF THE PLANE, INCOMPRESSIBLE, TURBULENT FREE SHEAR LAYER WITH ARBITRARY VELOCITY RATIO AND PRESSURE GRADIENT,
by C. M. Sabin. Oct 63, 122p. Rept. no. MD9
Grant AFOSR136 63
AFOSR TN5443 Unclassified report

Descriptors: (*Turbulence, Shear stresses), (*Turbulent boundary layer, Shear stresses), Boundary layer, Separation, Momentum, Transformations, Pressure, Velocity, Equations, Test equipment, Tests, Experimental data, Incompressible flow, Mathematical analysis, Jet mixing flow.

A first order approximation is derived in similarity coordinates for the velocity variation across a mixing zone between two streams of different velocities in an arbitrary pressure gradient. The velocity profiles obtained are functions of a single parameter, the ratio of the velocity of the slow stream to that of the fast stream. The first order velocity profiles are compared to those obtained from the complete solution to the zero pressure gradient case by Gortler and good agreement is found when the velocity ratio is greater than 0.5. The form of the eddy diffusivity appropriate to the first order theory is determined from analysis and experimental data. This form leads to an explicit transformation for the similarity coordinate requiring only a single empirical constant for all cases. This similarity coordinate is shown to reduce to Gortler's variable in the constant pressure case. Expressions for the shear and the mixing layer width for the general case are presented, and shown to check the data from several cases. A hot wire anemometer which was specially designed and constructed for taking the experimental data in a water channel is described. (Author)

AD-430 179 Div. 9
OTS price $2.60

Hydrodynamics Lab., Calif. Inst. of Tech., Pasadena.
AN EXPERIMENT CONCERNING PARTLY CLOSED CAVITIES BEHIND A SURFACE-PIERCING ROD,
by M. C. Meijer. Jan 64, 25p. Rept. no. E110.1
Contract Nonr22043
Unclassified report

Descriptors: (*Water entry, Cylindrical bodies), (*Cavitation, Water entry), Wake, Surfaces, Air, Vacuum, Bubbles, Drag, Test methods, Hydrodynamics, Rods.

The post-base ventilation state, as described by P. Thomsen in TRG, Inc., report 156 SR-2, did not occur in the free surface water tunnel in a natural manner. It could be obtained by partial closure of the gap in the water surface with a plate. Removal of this plate resulted always in a restoration of the original base ventilated state if the velocity was high enough. It seems reasonable to suppose that in the case of A. D. Hay's experiments (Flow About Semi-Submerged Cylinders of Finite Length, Princeton U., 1 October 1947) such a plate or other spray cover near the surface must have been present, which became effective at high velocities, when the spray sheet could make good contact with it. At the transition of the pre-base ventilation state and the base ventilation state, stable cavities did exist which were nearly closed near the water surface, or at a lower point. (Author)

AD-430 217 Div. 9
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON BASE PRESSURE FOR SOLIDS OF REVOLUTION IN A SUPERSONIC GAS FLOW,
by L. I. Vereshchagina. 10 Jan 64, 10p.
FTD TT63 1146 Unclassified report

Trans. from Lenigrad. Universitet. Vestnik. Seriya Mathematiki, Mehkaniki i Astronomii, no. 13, pp. 139-143, 1963.

Descriptors: (*Bodies of revolution, Base flow), Gas flow, Supersonic flow, Pressure, Laminar flow, Jet mixing flow, Supersonic characteristics, Mathematical analysis, Turbulence.

A mathematical analysis is presented of the problem of determining the bottom pressure for a solid revolution in a supersonic flow of gas. A method is proposed for computing the bottom pressure in the case of a turbulent mixing flow. (Author)

AD-430 278 Div. 9
OTS price $5.60

Minnesota Univ., St. Paul.
MASS AND HEAT TRANSFER RATES FOR LARGE GRADIENTS OF CONCENTRATION AND TEMPERATURE.
Final rept.,
by William E. Ranz and Philip F. Dickson.
16 Sep 63, 53p.
Contract DA11 022ORD3084, OOR Proj. 2340, DA Proj. 5B99 01 004
Unclassified report

Descriptors: (*Heat transfer, Transport properties), (*Turbulent boundary layer, Heat transfer), Stagnation point, Fluid dynamic properties, Flat plate models, Fluid flow, Temperature, Differential equations, Theory, Integral equations, Surface temperatures, Boundary layer, Diffusion, Heat transfer.

This report concerns a project in which the problem of large-gradient transfer was reviewed and redefined, experimental data were obtained in well-controlled systems, and return made to an earlier method of analysis which gains in physical generality what it loses in mathematical rigor. Stagnation regions and a completely turbulent boundary layer of a flat plate were chosen as general flow configurations worthy of careful study. In the systems studied attention was focused on physical aspects of the transfer problem, such as simultaneous transfer, variations in transport coefficients, large gradients in concentration and temperature, large concentrations of diffusion component, convection caused by diffusion, and primacy of boundary conditions. (Author)

AD-430 289 Div. 9, 25
OTS price $10.50

Minnesota U., Minneapolis.
COMMENTARY ON HEAT AND MASS TRANSFER IN BOUNDARY LAYERS. REVIEW AND EXTENSION OF APPROXIMATE METHODS,
by Dae Hyun Cho. 16 Sep 63, 13p. Rept. no. TR3
Contract DA11 0220RD3084, DA Proj. 5B99 01 004, OOR Proj. 2340
Unclassified report

Descriptors: (*Boundary layer, Heat transfer), Partial differential equations, Differential equations, Wedges, Theory, Velocity, Cylindrical bodies, Volume, Stagnation point, Two-demensional flow, Polynomials, Integral equations, Transport properties, Diffusion.

A review is presented of the heat (and or component mass transfer boundary layer concept. The review included the following: Basic Equations, Partial Differential Equations and Ordinary Differential Equations for Similar Boundary Layers; Literature Review, Exact Solutions, Acrivos' Asymptotic Methods, Series Methods for Wedge Flows, and Spalding's Methods; Extension of Nickel's Estimation Method to Heat and Mass Transfer, Estimation Theorem for Heat and Mass Transfer, Application of Nickel's Estimation Theorem, Discussion on Bracketing Unknown Exact Solutions with Lower and Upper Bounds; and Integral Methods - Two Dimensional Stagnation Flows, Integral Balances, and Polynomials of 3rd-degree for Boundary Layer Profiles. (Author)

AD-430 312 Div. 9
OTS price $2.60

Polytechnic Inst. of Brooklyn, N. Y.
RADIATING LAMINAR BOUNDARY LAYER OF A GREY GAS OVER A FLAT PLATE,
by Pasquale M. Sforza. Nov 63, 29p. Rept. no. 812
Contract Nonr839 34, Proj. No061 135
Unclassified report

Descriptors: (*Hypersonic flow, Optical phenomena), (*Laminar boundary layer, Thermal radiation), Flat plate models, Differential equations, Heat transfer, Gases, Atmosphere entry, Integral equations, Reflection, Absorption, Diffusion.

An analysis is presented of the nonsimilar laminar boundary layer flow of a radiating gás over a flat plate. It is assumed that the radiative properties are those for a grey gas and that no chemical reactions occur in the flow. An integral method is applied to the governing equations wherein the profiles of flow variables are chosen for their simplicity and their applicability to a two layer approach. Four parameters are left free in the assumed profiles: one in the velocity profile, two in the temperature profile, and a scale parameter between the two profiles. Different envelopes of dynamic and energetic effects are recognized thereby. A system of first order, nonlinear, ordinary differential equations describing the chordwise variation of profile parameters is presented and the solution to this system discussed. (Author)

AD-430 337 Div. 9
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FLOW WITH FRICTION AND HEAT EXCHANGE IN A CONICAL NOZZLE,
by D. V. Fedoseyev and S. V. Shteyman.
31 Dec 63, 1v.
FTD TT63 1040 Unclassified report

Trans. from Inzhenerno-Fizicheskiy Zhurnal, 6:8, pp. 41-44, 1963.

Descriptors: (*Gas flow, Conical nozzles), Supersonic nozzles, Cooling, Friction, Heat transfer, Supersonic flow, Mathematical analysis, Equations.

Flow in a supersonic conical cooled nozzle with friction is discussed. The parameters of the flow in each section are found as well as the impulse and the total-pressure recover coefficient. The document deals with the flow in a supersonic conical nozzle simultaneously taking into account the friction and heat exchange. (Author)

AD-430 370 Div. 9
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THIRD INTERINSTITUTIONAL SCIENTIFIC CONFERENCE OF PROBLEMS OF EVAPORATION, COMBUSTION AND GAS DYNAMICS OF DISPERSION SYSTEMS,
by D. I. Polishchuk. 8 Jan 64, 8p.
FTD TT63 944 Unclassified report

Trans. from Ukrains'kiy Fizichniy Zhurnal, 8:4, pp. 498-500, 1963.

Descriptors: (*Symposia, Fluid mechanics), Nozzles.

AD-430 410 Div. 9, 25, 2
OTS price $3.60

Avco Everett Research Lab., Everett, Mass.
AERODYNAMIC ASPECTS OF THE MAGNETOSPHERIC FLOW,
by R. H. Lery, H. E. Petschek and G. L. Siscoe.
Dec 63, 31p. Rept. no. RR170
Contract Nonr2524 00
Unclassified report

Descriptors: (*Earth, Magnetic fields), (*Continuum mechanics, Fluid flow), (*Plasma physics, Solar wind), Boundary layer, Shock waves, Topology, Motion, Hall effect, Aerodynamic charateristics, Hydrodynamics.

Numerous phenomena observed at the surface of the earth, in the magnetospheric cavity, and in the neighborhood of its boundary are related to the flow of the solar wind. The extent to which this flow can be analyzed by the techniques of continuum fluid mechanics is discussed in relation to the observational and theoretical evidence. Numerous calculations have been made to determine the shape of the magnetosphere cavity, the location of the bow shock, and the variations in flow properties within the shock layer. Observations of auroral motions and alignments have indicated

that flow patterns with appreciable velocities also exist inside the magnetosphere, thus suggesting appreciable coupling across the boundary. Analysis of such a boundary leads to a rate of reconnection of the field lines which decreases only logarithmically with the magnetic Reynolds number. The logarithmic dependence implies a rapid rate of reconnection which is insensitive to uncertainties in the effective conductivity of the plasma. Applying this result to the flow over the magnetosphere, the conclusion is that more than 10% of the magnetic field lines brought to the surface of the magnetosphere by the solar wind get broken and reconnected to the earth's polar field lines. (Author)

AD-430 414 Div. 9, 2
OTS price $3.60

David Taylor Model Basin, Washington, D. C.
THE MOTIONS OF A SPAR BUOY IN REGULAR WAVES,
by J. N. Newman. May 63, 34p.
DTMB 1499 Unclassified report

Descriptors: (*Slender bodies, Motion), Theory, Naval research, Linear systems, Floating bodies, Water waves, Equations, Damping, Frequency, Resonance, Cylindrical bodies, Theory, Velocity, Pressure, Fluid mechanics.

A linearized theory is developed for the motions of a slender body of revolution, with vertical axis, which is floating in the presence of regular waves. Equations of motion are derived which are undamped to first order in the body diameter, but second-order damping forces are derived to provide solutions valid at all frequencies including resonance. Calculations made for a particular circular cylinder show extremely stable motions except for the low frequency range where very sharp maxima occur at resonance. (Author)

AD-430 426 Div. 9
OTS price $6.60

Aerospace Corp., Los Angeles, Calif.
NONEQUILIBRIUM INVISCID FLOW ABOUT BLUNT BODIES,
by R. H. Lee and S. T. Chu. 20 Jan 64, 61p.
Rept. no. TDR269 4560 10 2
Contract AF04 695 269
SSD TDR63 369 Unclassified report

Descriptors: (*Hypersonic flow, Blunt bodies), (*Atmosphere entry, Chemical reactions), Shock waves, Axially symmetric flow, Reaction kinetics, Air, Nitrogen, Nitrogen compounds, Oxygen, Oxides, Numerical methods & procedures, Partial differential equations, Recombination reactions, Frozen equilibrium flow, Reentry vehicles.

An inverse method was used for analyzing the chemically nonequilibrium flow about a blunt body. This method starts with an assumed form of shock shape. The flow field and the thermodynamics behind the shock is determined by a finite difference mesh scheme. The calculation is continued until the sonic point on the body is exceeded. Mass flow rate is integrated along the curvilinear coordinate normal to the shock to determine locations and shapes of the body and the streamlines. The analysis assumes air to be a five-component reacting gas undergoing six coupled reactions with negligible ionization. Complete rate equations including three-body recombinations are used. Numerical examples are given for frozen and nonequilibrium air flows. Three different kinetic models are used for the reacting cases. The results show that even though the pressure and velocities in the shock layer are not sensitive to the air kinetics, the other thermodynamic properties are significantly influenced by the kinetic models chosen. The nitric oxide concentration is greatly enhanced by its direct formation from molecular oxygen and nitrogen. The extra amount of nitric oxide may cause an appreciable increase in gas cap radiation at high altitudes and superorbital velocities. (Author)

AD-430 595 Div. 9
OTS price $2.60

AVCO Everett Research Lab., Everett, Mass.
UNSTEADY ABLATION,
by Steven Georgiev. Sep 59, 28p. Research rept. 94
Contract AF04 647 278
AFBMD TR60 180 Unclassified report

Descriptors: (*Ablation, Quartz), Atmosphere entry, Heat transfer, High-temperature research, Theory, Thermal insulation.

The transient ablation process for nonradiating glassy materials is discussed and numerical calculations are presented for quartz along an ICBM trajectory. It is shown that the transient effects do not appreciably affect the amount of ablated material along the trajectory, but do significantly affect the amount of insulating material required after ablation ceases. The transient ablation analysis is also applied to quartz under arc wind tunnel heating conditions and it is shown that the experimentally obtained ablation history can be used to deduce the high temperature thermal diffusivity of the ablating material. (Author)

AD-430 599 Div. 9
OTS price $1.60

Aerochem Research Labs., Inc., Princeton, N. J.
DISSOCIATING GASES AS NATURAL CONVECTION COOLANTS,
by Daniel E. Rosner. 18 Feb 64, 14p. Rept. no. TP83
Contract AF49 638 1138
Unclassified report

Descriptors: (*Gases, Dissociation), (*Coolants, Convection), Liquids, Cooling, Turbine blades, Buoyancy, Acceleration, Rotation, Thermal expansion, Thermal conductivity, Polyatomic molecules, Stresses, Configuration, Fluid flow.

AD-430 701 Div. 9, 30
OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
FORCE AND PRESSURE TESTS OF AN AGARD CALIBRATION MODEL B AT A MACH NUMBER OF 10,
by R. K. Matthews and L. L. Trimmer. Feb 64, 36p.
Contract AF40 600 1000, Proj. VT2116
AEDC TDR64 31 Unclassified report

Descriptors: (*Wind tunnel models, Standardization), Cylindrical bodies, Pitch (Motion), Lift, Drag, Hypersonic characteristics, Angle of attack, Calibration, Pressure, Aerodynamic characteristics.

The AGARD Calibration Model B, with and without wings, was tested at a nominal Mach number of 10. Force and moment coefficients were obtained over a range of pitch and yaw angles from -5 to 15.5 degrees with a Reynolds number range from 1.10 x 10 to the 6th power to 9.80 x 10 to the 6th power, based on model length. The lift-curve slope, aerodynamic center, and drag coefficients show excellent correlation with data from other tunnels at various Mach numbers. (Author)

Division 9 - FLUID MECHANICS

AD-430 710 Div. 9
OTS price $4.60

Princeton U., N. J.
AN EXPERIMENTAL INVESTIGATION OF LAMINAR HYPERSONIC CAVITY FLOWS,
by K. M. Nicoll. Jan 64, 44p.
Contract AF33 616 7629, Proj. 7064, Task 7064 01
ARL 63 73 pt. 2 Unclassified report

Descriptors: (*Hypersonic flow, Conical bodies), Heat transfer, Laminar flow, Separation, Wind tunnel models, Heat transfer coefficients, Helium.

An experimental investigation was made of the recovery factor and heat-transfer distributions on a set of cone-models incorporating annular cavities. This study is the second part of a two-part program. The first section contained measurements of the pressure distributions. The results show that the recovery factor in laminar, hypersonic cavity flow is almost constant within the cavity and downstream of reattachment, and is very close to the laminar attached-flow value. In the immediate vicinity of reattachment, the recovery factor is slightly higher than this value (less than 5%). The lowest values of the heat-transfer coefficient are found on the cavity floors, where a minimum of about 10 to 20% of the attached-flow value is reached. The highest values of the heat-transfer coefficient are in the immediate vicinity of reattachment. An average reattachment heat-transfer coefficient of about three times the basic cone heat-transfer coefficient was measured on one cavity model. (Author)

AD-430 711 Div. 9
OTS price $15.00

Minnesota U., Minneapolis.
EXPERIMENTAL PRESSURE AND HEAT TRANSFER DISTRIBUTIONS ON BLUNT-NOSE DELTA WINGS FOR ANGLES OF ATTACK UP TO 30 DEGREES AT MACH NUMBER 7.
Final rept.,
by R. D. Archer, W. L. Melnik and R. Hermann.
Dec 63, 226p.
Contract AF33 616 7402, Proj. 7064, Task 7064 01
ARL 63 231 Unclassified report

Descriptors: (*Delta wings, Hypersonic characteristics), Wind tunnel models, Pressure, Heat transfer, Flow visualization, Angle of attack, Photographs, Instrumentation, Slender bodies, Conical bodies, Viscosity.

Surface pressure and aerodynamic heat transfer distributions were measured over slender blunt-nosed delta wings of elliptic cross-section at Mach 6.8 with unit Reynolds of 2 and 4x10 to the 4th power per in. over an angle of attack from 0 to 30 degrees. The basic shapes of the delta wings consisted of elliptic cones having a 5-to-1 ratio major to minor axis. Some details of the aerodynamic and viscous flow phenomena, including surface flow details, were determined from experiment. The effect of leading edge sweep angle was obtained with models having 70 and 80 degrees sweepback. Nose bluntness effects were determined from comparison of results obtained with sharply pointed and oblate and prolate spheroidal nose sections. Detailed surface pressure and heat transfer distributions were measured on a large scale model of an oblate spheroid. Pitot pressure profiles measured through the shock layer of a sharply pointed delta wing at zero angle of attack having 70 degrees sweepback indicated the flow was nearly two-dimensional in the plane of symmetry. A significant dependence on Reynolds number was observed in the surface pressure and heat transfer distributions, especially for increasing angles of attack. Fluid properties on the windward surfaces of the delta wings were strongly influenced by boundary layer separation on the leeward side. (Author)

AD-430 718 Div. 9, 15
OTS price $17.50

Rand Development Corp., Cleveland, Ohio.
CONTRIBUTIONS TOWARD SOLUTIONS OF THE EQUATIONS OF HYDRODYNAMICS, PART A. THE CONTINUUM LIMITATIONS OF FLUID DYNAMICS,
by A. S. Iberall. Dec 63, 271p.
Contract Nonr34 500, Proj. NR062 264
Unclassified report

Descriptors: (*Hydrodynamics, Equations), (*Boundary value problem, Partial differential equations), Fluid mechanics, Continuum mechanics, Laminar flow, Turbulent boundary layer, Numerical analysis, Elasticity, Acoustics, Vacuum apparatus, Turbulence, Thermodynamics, Stresses, Solids, Gases, Ultrasonic radiation, Kinetic theory, Heat transfer.

The object of these studies is to develop an analytic methodology for solving hydrodynamic problems for both laminar and turbulent flow. In this first report, the physical background and limitations of the pertinent hydrodynamic equations are discussed. In particular, continuum fluid mechanics is delimited from bordering fields of rheological flow, of multi-phase flow, and of non-continuum flow because of high frequency or high vacuum. This exploration leads to specific parametric criteria for which the continuum flow equations are valid. The general method of solution for laminar flow is sketched out for a particular boundary value problem. The turbulent flow equations for the same boundary value problem are introduced. (Author)

AD-430 729 Div. 9, 31
OTS price $28.50

Office of Naval Research, Washington, D. C.
THIRD SYMPOSIUM ON NAVAL HYDRODYNAMICS HIGH-PERFORMANCE SHIPS, SPONSORED BY THE OFFICE OF NAVAL RESEARCH AND THE NETHERLANDS SHIP MODEL BASIN, SEPTEMBER 19-22, 1960, SCHEVENINGEN, NETHERLANDS,
ed. by Stanley W. Doroff. 1963, 632p.
ONR ACR65 Unclassified report

Descriptors: (*Hydrodynamics, Symposia), Hydrodynamic configurations, Ship hulls, Ship models, Ships (Nonmilitary), Hydrofoils, Planing surfaces, Floating bodies, Hydrofoil boats, Design, Submarine hulls, Submarine models, Submarines, Laminar flow, Oceanographic vessels, Cargo ships, Tankers, Pitch (Motion).

Contents: Size, type, and speed of ships in the future; On the efficiency of a vertical-axis propeller; A solution of the minimum wave resistance problem; The hydrodynamics of high-speed hydrofoil craft; On hydrofoils running near a free surface; The effect of size on the seaworthiness of hydrofoil craft, Design and initial test of ONR supercavitating hydrofoil boat XCH-6; and Ground effect machine research and development in the United States.

AD-430 776 Div. 9
OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
LAMINAR BOUNDARY LAYER CALCULATIONS BY FINITE DIFFERENCES,
by W. Parr. Mar 64, 25p.
NOL TR63 261 MDR M42 Unclassified report

Descriptors: (*Laminar boundary layer, Numerical methods & procedures), Axially symmetric flow, Compressible flow, Incompressible flow, Partial differential equations, Boundary value problems, Mathematical analysis.

Calculation of the laminar boundary layer in axially symmetric flow by the use of finite differences is described. Discussed are the Prandtl differential equations, finite difference approximations, stability, convergence, starting procedures, and the gas assumptions. The principal advantage of finite differences is that no simplifying assumptions whatsoever are necessary. (Author)

AD 430 798 Div. 9, 25
OTS price $7.60

West Virginia U., Morgantown.
AN INTEGRAL EQUATION APPROACH TO HEAT CONDUCTION PROBLEMS WITH NON-LINEAR BOUNDARY CONDITIONS,
by Darius Nelson Brant. 1963, 78p.
Grant AF AFOSR113 163
Unclassified report

Master's thesis.

Descriptors: (*Heat transfer, Integral equations), (*Aerodynamic heating, Heat transfer), Numerical methods and procedures, Integral transforms, Surfaces, Thermal radiation, Thermal conductivity.

A numerical method is developed for solving heat conduction problems with nonlinear boundary conditions by step-wise integration of a singular, Volterra integral equation of the second kind. This equation is formulated by use of Laplace transforms and the convolution theorem. The method is developed and tested by solving for the surface temperature (over a large time range) of an infinite slab radiating to a zero sink. The finite slab solution is also demonstrated and the application to other boundary conditions is discussed. The numerical integration is performed by dividing the integrand into three regions which exhibit different behaviors. By using special devices in two of these regions the difficulties due to the singular nature of the integral were circumvented without resorting to iteration procedures. (Author)

AD-430 829 Div. 9
OTS price $8.60

Midwest Research Inst., Kansas City, Mo.
RESEARCH ON PANEL FLUTTER OF CYLINDRICAL SHELLS. Final rept.,
by Ronald O. Stearman. Jan 64, 81p.
Contract AF49 638 1189, Proj. 9782, Task 9782 01
AFOSR 64 0074 Unclassified report

Descriptors: (*Flutter, Stiffened cylinders), (*Cylindrical bodies, Flutter), Panels (Structural), Supersonic characteristics, Aerodynamic loading, Supersonic flow, Structural shells, Flat plate models, Mathematical analysis, Compressor blades, Theory, Functions, Tables, Integral equations.

A theoretical study was made on the panel flutter characteristics of a ring and longeron stiffened circular cylindrical shell at high supersonic Mach numbers. This study is an extension of an earlier program and uses the cyclic reduction procedure developed there to simplify the flutter analysis. This actual reduction procedure has been included in this report for completeness. An improved modal analysis was employed in this study which leads to an increased understanding of the flutter behavior of such complex structures at the high supersonic Mach numbers. A method for extending the above analysis to the lower supersonic Mach numbers is also discussed. An investigation of the aerodynamic pressures on cylindrical shells in unsteady supersonic potential flow has also been carried out. A general solution for these aerodynamic pressures was obtained which is valid at both the high and low supersonic Mach numbers. The general solution was expressed in terms of Randall functions by reducing the unsteady flow problem to an equivalent steady flow problem through an appropriate transformation. Certain limiting cases of this general solution are presented along with their well-known flat plate counterparts. Finally, an analytical approximation is developed for the Randall functions which would be useful in a cylindrical shell panel flutter analysis. (Author)

AD-430 928 Div. 9, 31
OTS price $5.60

Naval Ordnance Test Station, China Lake, Calif.
A LIFTING-SURFACE PROPELLER DESIGN METHOD FOR HIGH-SPEED COMPUTERS,
by D. M. Nelson. Jan 64, 54p.
NOTS TP3399; NAVWEPS 8442
Unclassified report

Descriptors: (*Propellers (Marine), Design), Hydrodynamics, Data processing system, Propeller blades, Lift, Thickness, Pitch (Motion), Vortices, Hydrodynamic configurations, Programming (Computers), Digital computers, Mathematical analysis, Torpedo components.

A propeller design method that treats the blades as lifting surfaces has been developed and programmed on an IBM 7090 computer. The singularity distributions representing the bound circulation, shed vorticity, and blade thickness are treated as continuous sheets, making it necessary to determine the Cauchy principal value of the improper integrals expressing the induced velocities on the blades. The camber lines and pitch angles are determined from the variation of the normal component of induced velocity across the blade. This method is applicable to moderately loaded, non-optimum, wake-adapted propellers with or without skew. (Author)

AD-430 954 Div. 9
OTS price $1.10

Redstone Scientific Information Center, Redstone Arsenal, Ala.
ON THE MOTION OF A LIQUID IN AN OSCILLATING CONTAINER,
by V. V. Bolotin, tr. by Walter Urusky. 14 Feb 64, 9p.
RSIC 133 Unclassified report

Trans. from Prikladnaia Matematika i Mekhanika, 20, pp. 293-294, 1956.

Descriptors: (*Liquids, Containers), (*Motion, Liquids), (*Containers, Oscillation), Mathematical analysis, Linear systems, Stability, Acceleration, Resonance, Dynamics.

AD-430 991 Div. 9, 12
OTS price $8.60

Midwest Research Inst., Kansas City, Mo.
RESEARCH ON PANEL FLUTTER OF CYLINDRICAL SHELLS,
by Ronald O. Stearman. Jan 64, 96p.
Contract AF49 638 1189, Proj. 9782, Task 778201
AFOSR 64 0074 Unclassified report

Descriptors: (*Flutter, Cylindrical bodies), Supersonic characteristics, Stiffened cylinders, Mathematical analysis, Guided missiles, Aeroelasticity, Tables, Functions, Bessel functions, Theory, Structural shields.

Division 9 - FLUID MECHANICS

A theoretical study was made on the panel flutter characteristics of a ring and longeron stiffened circular cylindrical shell at high supersonic Mach numbers. This study is an extension of an earlier program and uses the cyclic reduction procedure developed there to simplify the flutter analysis. This actual reduction procedure is included for completeness. An improved modal analysis was employed in this study which leads to an increased understanding of the flutter behavior of such complex structures at the high supersonic Mach numbers. A method for extending the above analysis to the lower supersonic Mach numbers is also discussed. (Author)

AD-431 089 Div. 9
OTS price $6.60

Southwest Research Inst., San Antonio, Tex.
EXPERIMENTAL DETERMINATION OF OSCILLATORY LIFT AND MOMENT DISTRIBUTIONS ON SURFACE-PIERCING FLEXIBLE HYDROFOILS,
by Guido E. Ransleben, Jr. 2 Dec 63, 69p.
Rept. no. TR3
Contract Nonr333500, SwRI Proj. 38 1028 2
Unclassified report

Descriptors: (*Hydrofoils, Lift), Oscillation, Pitch (Motion), Moments, Model tests, Test equipment, Torque, Deflection, Pressure, Hydrodynamics, Rectangular bodies.

Measured spanwise distributions of oscillatory lift and moment of surface-piercing cantilever subcavitating hydrofoils are presented. The hydrofoils were of aspect ratio 5 rectangular planform, 65.5% submerged. The data are compared with measured data from the same models fully submerged. (Author)

AD-431 098 Div. 9, 15
OTS price $7.60

Mathematics Research Center, U. of Wisconsin, Madison.
ON WAVE FRONTS AND BOUNDARY WAVES,
by G. F. D. Duff. Nov 63, 71p. Rept. no. TSR434
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Wave transmission, Partial differential equations), Boundary layer, Reflection, Statistical mechanics, Electromagnetic waves, Acoustics, Waves.

For a scalar field governed by a linear hyperbolic partial differential equation with constant coefficients, the wave fronts and their singularities arising from a point source in space-time are studied. The calculus of distributions is employed to represent the elementary solution, and a method of stationary phase to describe asymptotically its singularities. The occurrence of coincident characteristic roots, giving rise to ruled surface singularities, is first considered. The main portion of the paper concerns the reflection of the waves at a plane boundary, where several further types of waves can arise. Head waves and branch waves arise from branch points associated with real and complex normal roots. The Rayleigh and supersonic waves arise from poles of a certain boundary discriminant, and the latter type has an extended domain of dependence. (Author)

AD-431 190 Div. 9
OTS price $1.50

Southampton U. (Gt. Brit.).
RESEARCH IN BOUNDARY LAYER OSCILLATIONS AND NOISE,
by M. K. Bull and J. L. Willis. Feb 64, 51p.
Contract AF61 052 358, Proj. 1370, Task 137005
RTD TDR63 4012 Unclassified report

Report on Dynamic Problems in Flight Vehicles.

Descriptors: (*Turbulent boundary layer, Noise), (*Aerodynamic characteristics, Noise), Instrumentation, Surfaces, Vibration, Acoustic properties, Panels (Structural), Airplane panels, Pressure, Excitation, Noise generators, Oscillation.

Experimental data are presented on the r.m.s. levels, frequency spectra, probability distributions and space-time correlations of the pressure field as a whole, and in narrow frequency bands, for turbulent layers on smooth surfaces. General qualitative effects of a surface discontinuity on the r.m.s. pressure and frequency spectrum are given. An empirical representation of the space-time correlation pattern of the pressure field is developed for the purposes of structural response calculations. A general program for the study of a mechanism of boundary layer turbulence is presented along with a discussion of the testing and analyzing instrumentation. An analytical method is presented for the prediction of the power spectral density of panel response to boundary layer and siren excitation. An empirical equation is developed relating the acoustic power output from a unit area of a (large) surface subject to turbulent boundary layer flow to the aerodynamic flow parameters. (Author)

AD-431 194 Div. 9
OTS price $3.50

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
PRESSURE MEASUREMENTS FOR MACH FIVE FLOWS OVER A BLUNT PYRAMIDAL CONFIGURATION WITH AERODYNAMIC CONTROLS. PART OF AN INVESTIGATION OF HYPERSONIC FLOW SEPARATION AND CONTROL CHARACTERISTICS,
by Louis G. Kaufman II. Jan 64, 250p.
Contract AF33 616 8130, Proj. 8219, Task 821902
RTD TDR63 4239 Unclassified report

Descriptors: (*Delta wings, Hypersonic characteristics), (*Aerodynamic control surfaces, Hypersonic characteristics), Hypersonic flow, Separation, Pressure, Heat transfer, Wind tunnel models, Model tests, Blunt bodies, Trailing control surfaces, Flaps, Aerodynamic heating, Photographs, Canard configurations, Fins, Experimental data, Wedges, Angle of attack.

Pressure data were obtained for Mach 5 flows over a blunt pyramidal configuration composed of a 70-degree sweepback delta wing surface and two dihedral surfaces. Trailing edge flap deflections were varied up to 40 degrees on all surfaces and the model was tested with and without canards and ventral fins. The model was pitched at angles of attack from -30 degrees to +45 degrees and at sideslip angles up to 15 degrees for a Reynolds number, based on model length, of 4.6 million. (Author)

AD-431 195 Div. 9
OTS price $3.00

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
PRESSURE AND HEAT TRANSFER MEASUREMENTS FOR MACH 8 FLOWS OVER A BLUNT PYRAMIDAL CONFIGURATION WITH AERODYNAMIC CONTROLS. PART I, PRESSURE DATA FOR DELTA WING SURFACE,
by Louis G. Kaufman, II. Jan 64, 154p.
Contract AF33 616 8130, Proj. 8219, Task 821902
Unclassified report

Descriptors: (*Delta wings, Hypersonic characteristics), (*Aerodynamic control surfaces, Hypersonic characteristics), Pressure, Heat transfer, Wind tunnel models, Wedges, Model tests, Trailing control surfaces, Flaps, Canard configurations, Fins, Experimental data, Hypersonic flow, Separation, Blunt bodies, Angle of attack.

Pressure and heat transfer data were obtained for Mach 8 flows over a blunt pyramidal configuration composed of a 70-degree sweepback delta wing surface and two dihedral surfaces. Trailing edge flap deflections were varied up to 50 degrees on all surfaces, and the model was tested with and without canards and ventral fins. The model was pitched at angles of attack between ±54 degrees and was tested at sideslip angles of 0 and 12 degrees for free stream Reynolds numbers, based on model length of 1.5 and 4.5 million. (Author)

10. FUELS AND COMBUSTION

AD-429 928 Div. 10
OTS price $13.50

Applied Physics Lab. Johns Hopkins U., Silver Spring, Md.
EXPERIMENTAL TECHNIQUES FOR THE STUDY OF FLAME STRUCTURE,
by Robert M. Fristrom. Jan 63, 197p. Rept. no. 300
Contract NOw62 0604c
Unclassified report

Descriptors: (*Flames, Physical properties), (*Test methods, Flames), Microstructure, Reports, Temperature, Aerodynamic characteristics, Velocity, Thermocouples, Configuration, Thermometers, Mass spectroscopy, Oxygen, Hydrocarbons, Gases, Charged particles, Atoms, Free radicals, Stability, Distribution, Orifices, Illumination.

Contents: The experimental study of flame microstructure; Burner systems; Local aerodynamics of flame fronts; The experimental determination of local temperatures in flame fronts; Determination of composition of stable species in flame; Determination of concentration of unstable species in flames; and Distance measurements in flames.

AD-429 937 Div. 10
OTS price $3.60

Southwest Research Inst., San Antonio, Tex.
REVIEW OF LITERATURE ON STORAGE AND THERMAL STABILITY OF JET FUELS,
by Robert K. Johnston and E. L. Anderson.
Jan 64, 30p.
Contract AF33 657 11246, Proj. 3048, Task 304801
RTD TDR63 4270 Unclassified report

Descriptors: (*Jet engine fuels, Reviews), (*Reviews, Jet engine fuels), (*Storage, Jet engine fuels), Heat, Stability, Fuel additives, Degradation, High-temperature research, Antioxidants, Ice prevention, Test methods.

A selective review has been made of the technical literature on storage and thermal stability of jet fuels, in order to provide background for a current experimental program on the effect of additives in JP-6 fuel deterioration. The literature review and also the experimental program are directed primarily toward information on deterioration of thermal stability during normal storage. The subjects reviewed include thermal stability test methods, storage stability and deterioration of thermal stability, additives for improvement of thermal and storage stability of jet fuels, and special storage problems. (Author)

AD-430 272 Div. 10
OTS price $5.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
FUEL-OPTIMAL SINGULAR CONTROL OF A NONLINEAR SECOND ORDER SYSTEM,
by M. Athans and M. D. Canon. 30 Jan 64, 54p.
Rept. no. 64 12
Contract AF19 628 500
ESD TDR64 30 Unclassified report

Descriptors: (*Fuel consumption, Non-linear systems), Optimization, Equations, Control, Energy management, Theory, Motion, Costs.

Studies were made on the problem of fuel-optimal control of nonlinear second order systems; one of the objectives was to determine to what extent the techniques can be extended and whether there are properties of the optimal control for nonlinear systems which differ from the corresponding ones for linear systems. As demonstrated, the nonlinear optimal system considered has singular solutions which did not arise in the case of linear systems. (Author)

AD-430 591 Div. 10, 26
OTS price $3.60

Hercules Powder Co., Kenvil, N. J.
DEVELOPMENT OF HIGH TEMPERATURE-RESISTANT PROPELLANTS,
by R. L. Simmons. Jan 64, 27p.
Contract DA36 038 507ORD3572M, Proj. 1362, Task 136205
RTD TDR63 4209; FA R1703
Unclassified report

Descriptors: (*Propellants, Stability), (*Binders, Heat-resistant materials), Potassium compounds, Perchlorates, HMX, Aging (Materials), Synthetic rubber, Storage, Degradation, Silicone plastics, Halocarbon plastics, Nitrates, Propellant grains, Extrusion, N-heterocyclic compounds, Oxygen compounds.

Propellants with silicone and fluorocarbon binders possessed superior heat resistance to the synthetic rubbers, but lacked energy. Carbon black and powdered aluminum were added to these propellants to boost the impetus, but without success. A slight improvement was noted only with aluminum in a fluorocarbon. Potassium nitrate was investigated as a chlorine-free inorganic heat-resistance oxidizer in a synthetic rubber binder, but none of the compositions would ignite. The addition of powdered aluminum and boron did not aid combustion. Cyclotetramethylene tetranitramine (HMX) was found to have promise as an organic heat resistant oxidizer in a synthetic rubber binder where it gave greater impetus than potassium perchlorate; however, burning rate was considerably slower. None of the HMX propellants exhibited enough heat resistance to meet the 400 F objective, but one composition, HES-6616, showed potential 300 to 350 F resistance. (Author)

AD-430 909 Div. 10, 4
OTS price $2.60

Texaco Experiment, Inc., Richmond, Va.
THE COMBUSTION OF ELEMENTAL BORON WITH FLUORINE. Final rept.,
by U. V. Henderson, Jr., H. P. Woods and Genevieve Poplin. 3 Feb 64, 24p. Rept. no. EXP223, TP209
Contract Nonr188300
Unclassified report

Descriptors: (*Oxidizers, Fluorine), (*Boron, Combustion), (*Fluorine, Combustion), Single crystals, Rods, Fluorination, Solid rocket fuels, Reaction kinetics, High-temperature research, Low-pressure research, Photomicrography, Surface properties, Mass spectroscopy, Chemical reactions, Ions, Intensity, Boron compounds, Fluorides, Ionization potentials.

Comparable experiments were carried out with both single-crystal and polycrystalline boron rods. Good reproducible data were difficult to obtain in any event, but much better results were obtained from single-crystal experiments. Although there was comparatively little scatter in the data points obtained in any single experiment from which the rate data were derived, appreciable scatter is noticeable in the plot of rate

vs temperature and pressure, due undoubtedly to difficulties in accurately measuring the temperature of the rod (assumed to be in thermal equilibrium with the wall of the reactor, on the basis of separate experiments) and in accurately measuring the pressure of the fluorine. For single-crystal boron fluorination in the 0.1 to 1 torr region, the data indicate a reaction that is independent of fluorine pressure up to about 600 K. At about this temperature there is a change in the rate-limiting process and the rate increases with fluorine pressure. No such conclusions could be obtained from the polycrystalline boron experiments. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

No Entries

12. GUIDED MISSILES

AD-429 393 Div. 12, 26
OTS price $4.60

A. C. Spark Plug Div., General Motors Corp., Milwaukee, Wis.
PROGRAM 624A-TITAN III INERTIAL GUIDANCE SYSTEM, RELIABILITY AND QUALITY ASSURANCE PROGRAM STATUS.
Quarterly program progress rept., 1 Oct-31 Dec 63.
31 Jan 64, 1v. Rept. no. 64 20
Contract AF04 695 282
Unclassified report

Descriptors: (*Inertial guidance, Launch vehicles (Aerospace)), (*Launch vehicles (Aerospace), Inertial guidance), Research program administration, Design, Test equipment, Test methods, Flight testing, Logistics, Instruction manuals, Reliability, Reliability (Electronics), Quality control, Ground support equipment, Checkout equipment, Simulation, Test equipment (Electronics).

Contents: Design and Development, (Systems engineering activities, Equipment design engineering activities, and Test equipment engineering activities); Test Programs, (Inplant test program, and Flight test program); Support Activities, Training, and Manuals, (Logistic and maintenance engineering activities, PERT operations, Packaging engineering activities, Training activities, and Field service publications); Reliability and Quality Assurance Programs, (Reliability program; and Quality assurance program).

AD-429 485 Div. 12, 26, 8, 7
OTS price $23.50

Boeing Co., Seattle, Wash.
MINUTEMAN MONTHLY FAILURE SUMMARIES - JANUARY, 1964,
11 Feb 64, 1v Document no. D2 5286 48
Contracts AF04 694 422, AF04 694 107
Unclassified report

Descriptors: (*Guided missile components, Failure (Mechanics)), (*Failure (Mechanics), Guided missile components), Guided missiles (Surface to surface).

AD-429 495 Div. 12
OTS price $3.60

Army Air Defense Board, Fort Bliss, Tex.
SERVICE TEST OF NEW EQUIPMENT FOR CREEPER TARGET MISSILE SYSTEMS OQ-19B AND OQ-19D (MQM-33A AND MQM-33B).
27 Dec 63, 1v.
ATECOM Proj. 34 5010 02
AADB GM2863 Unclassified report

Descriptors: (*Target drones, Command and control systems), (*Command and control systems, Electronic equipment), Ground support equipment, Guided missiles, Army, Radio receivers, Radio equipment, Automatic pilots, Misalignment, Corrections, Tests, Antennas, Hazards, Guidance, Control, Maintenance.

The US Army Air Defense Board recommends that: 1. The RPS-1A Direct Command Guidance System (Roll Trim Controller) and the AN/ARW-79 Autopilot, with appropriate modifications to the ground control equipment, be considered suitable for use with the MQM-33B and MQM-33A target missiles, respectively. 2. The R-1182/ARW-79 and KY489/ARW-79 (500 mc) Radio Receiver and Decoder be considered suitable for use with the MQM-33 type target missile with responsibility for component replacement assigned to field maintenance units. 3. Using units be permitted to elongate by two inches the antenna cable openings in the vertical stabilizer bottom plate and in the fuselage when using L shaped connectors on the antenna cables. 4. The 406 to 549 mc stub antennas required by the Receiver-Decoder and by the Autopilot be provided with a protective button on their tips. 5. Organizational maintenance repairmen receive formal training in the maintenance of solid-state electronic circuits. (Author)

AD-429 532 Div. 12
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
LAUNCH VEHICLE PERFORMANCE REQUIREMENTS FOR RENDEZVOUS WITH SATELLITES IN 200-NAUTICAL MILE CIRCULAR ORBITS OF 60 DEGREES INCLINATION,
by G. L. Coates. 15 Dec 63, 33p. Rept. no. TDR269 4130 10 7
Contract AF04 695 269
SSD TDR63 320 Unclassified report

Descriptors: (*Rendezvous trajectories, Launch vehicles (Aerospace)), (*Launch vehicles (Aerospace), Rendezvous trajectories), Ascent trajectories, Circular orbit trajectories, Velocity, Simulation, Optimization, Data, Satellites (Artificial), Military requirements.

The total ideal velocity required of the launch vehicle to achieve gross rendezvous with satellites in 60-degree inclination, 200-nautical mile altitude circular orbits was determined as a function of the launch azimuth, the relative epoch of the orbit, and the pass on which rendezvous takes place. A direct ascent launch vehicle trajectory was assumed. Precision flight simulation techniques were used throughout except for the assumption of an impulsive adaptation maneuver. The effects of liftoff time dispersions were not included; the study was rather concerned with the selection and characteristics of nominal trajectories. (Author)

AD-429 791 Div. 12, 8
OTS price $4.60

Sylvania Electronic Systems, Needham, Mass.
GROUND ELECTRONICS SYSTEMS FOR WS-133B (MINUTEMAN). PLAN FOR PRODUCTION ENVIRONMENTAL TESTING OF THE GROUND ELECTRONICS SYSTEM (RESEARCH AND DEVELOPMENT PROGRAM),
by L. McGonigle. 20 Jan 64, 1v. Rept. no. MPO PD0042, rev. 2
Contract AF04 694 261
Unclassified report

Supersedes rept. no. MPO PD 0042 dated 5 Dec 63.

Descriptors: (*Guided missiles (Surface-to-surface), Ground support equipment), (*Environmental tests, Electronic equipment), Electronic equipment, Environmental tests, Vibration, Failure (Mechanics), Malfunctions.

AD-429 841 Div. 12
OTS price $6.60

Boeing Co., Seattle, Wash.
FLIGHT ARTICLE MASS PROPERTIES REPORT FOR MINUTEMAN WING III AND IV COMPONENTS FOR MISSILE 1005-1029,
by Donald Hanson. 17 Jan 64, 67p. Document no. D2 13946 13
Contract AF04 694 46
Unclassified report

Descriptors: (*Guided missile components, Weight), Weight, Stability, Guided missiles (Surface-to-surface), Load distribution.

Mass property summaries of the Boeing components for a series of Operational Wing III and IV Minuteman missiles are given. The serialized components included in the data for each missile are those committed to that particular missile during the course of production in Seattle and may not be the ones finally installed during assembly at Air Force Plant 77. (Author)

AD-429 842 Div. 12
OTS price $5.60

Boeing Co., Seattle, Wash.
AIR FORCE PLANT 77 FLIGHT ARTICLE MASS PROPERTIES REPORT FOR LGM-30B MISSILES 973 - 1015,
by Roger Powell. 17 Jan 64, 53p. Document no. D2 13947 10
Contract AF04 694 46
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Weight), Stability, Load destribution, Seals (Stoppers), Sealing compounds.

The nominal sealant weight and balance summary for LGM-30B missiles, the weight effect of all changes incorporated at Plant 77 not reported in D2-13946-X, and a configuration page for each missile included in this report are given. (Author)

AD-430 199 Div. 12
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
BUBBLE LEVELS AS ATTITUDE SENSORS IN SATELLITES,
by A. S. Gutman. 15 Jan 64, 37p. Rept. no. TDR269 4513 10 3
Contract AF04 695 269
SSD TDR63 373 Unclassified report

Descriptors: (*Attitude indicators, Bubbles), (*Horizontal indicators, Satellite attitude), Vertical indicators, Satellites (Artificial), Accelerometers, Instrumentation, Circular orbit trajectories, Gravity, Monitors.

A fluid level is investigated as a means of sensing the local vertical of an attitude stabilized satellite. Such an instrument acts in a manner very similar to a pendulum with low friction. The time constant of the instrument is calculated and errors of the local vertical due to dynamic accelerations are analyzed. It is found that the primary errors in an attitude stabilized satellite are caused by angular accelerations. An angular accelerometer is described which can be used in conjunction with the bubble level to calculate the direction of the local vertical instantaneously. Without this angular accelerometer the bubble level can be used to indicate the long term average attitude of the satellite. (Author)

AD-430 239 Div. 12
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE WAY TO THE COSMOS,
by V. Dobronravov. 3 Jan 64, 11p.
FTD TT63 975 Unclassified report

Trans. from Krylya Rodiny, No. 6, pp. 20-22, 1957.

Descriptors: (*Space stations, Manned spacecraft), Weightlessness, Space environmental conditions, Laboratory animals, Rockets, Space capsules, Rendezvous spacecraft, Theory.

AD-430 271 Div. 12
OTS price $1.60

Ogden Air Materiel Area, Hill AFB, Utah.
SHELF AND SERVICE LIFE TEST ON EXPLOSIVE, HOLD DOWN BOLT, P/N C5243, TITAN I MISSILE,
by Jesse S. Calloway. Jan 64, 20p.
OOY TR64 764 Unclassified report

Descriptors: (*Explosive actuators, Bolts), Tests, Performance (Engineering), Quality control, Bolted joints, Maintenance, Release mechanisms, Guided missile launchers, Life expectancy.

The One Inch Dual Charge, Explosive Launch Bolt is used as the mating equipment to release the toggle hold-down mechanism of the Launcher which in turn releases the Titan I Missile. The purpose of this test was to obtain engineering data that could be evaluated to determine if its shelf and service life could be extended. A shelf and service life of 2 years was previously established by the manufacturer. Because of the expiration of this service life, it was necessary to replace the hold-down bolts after two years. One hundred and three bolts, which had been previously installed on missiles for two years, were function tested to determine if they were still serviceable. The bolts were temperature conditioned from -40 F to +160 F to demonstrate their functional ability under extreme conditions. All the bolts functioned satisfactorily and demonstrated a reliability of 99.6 % at 50 % confidence level. It was recommended that the shelf life be extended to 4 years and the service life to 3 years. (Author)

AD-430 377 Div. 12, 27
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MISTRESS OF THE STRATOSPHERE REPORT FROM BOARD A ROCKET CARRIER,
by Ye. Smirnov. 8 Jan 64, 8p.
FTD TT63 943 Unclassified report

Trans. from Krasnaya Zveda, (Russian), 194, p.1, 17 Aug 63.

Descriptors: (*Jet bombers, Night flight), Military training, Newspapers, Reports, Mission profiles, Bombing, Night bombing, Propaganda, Pilots.

AD-430 723 Div. 12, 22
OTS price $1.10

Naval Missile Center, Point Mugu, Calif.
TEST AND EVALUATION OF AQM-37A.
13 Feb 64, 3p.
Proj. RM45 1
Unclassified report

Descriptors: (*Target drones, Performance (Engineering)), Experimental data, Drones, Navy, Launching, Attack bombers, Jet bombers, Naval aircraft, Photographs, Flight testing.

The following conclusions are made in corresponding order of the test objectives: (a) Because the target did not maintain level flight, there was no test to determine the target low altitude, level flight profile after being launched at 2,000 feet pressure altitude at a speed of 0.6 Mach indicated. (b) The target separation characteristics from the A-4B aircraft in a low altitude environment appear to be satisfactory. (Author)

Division 12 - GUIDED MISSILES

AD-430 735 Div. 12, 30, 15
OTS price $15.00

Wolf Research and Development Corp., West Concord, Mass.
DIFFERENTIAL ORBIT CORRECTION AND STATION LOCATOR PROGRAM DOC - II,
by Richard M. Moroney and Isabel M. Hussey.
Feb 64, 227p. Rept. no. SR3
Contract AF19 628 2379, Proj. 7600, Task 760003
AFCRL 64 55 Unclassified report

Descriptors: (*Orbital trajectories, Programming (Computers)), (*Flight paths, Satellites (Artificial)), Programming languages, Theory, Differential equations.

The analysis and programming associated with performing a differential correction to orbital elements and/or station positions from weighted observations of range, range rate, azimuth-elevation and/or right ascension-declination on close earth satellites are described. The ephemeris computation considers perturbations due to the earth's gravitational potential as described by a spherical harmonic representation through n = m = 5, the lunar gravitational potential, air drag and radiation pressure. All observations may be simulated in punched card form for the purposes of conducting geometric studies. (Author)

AD-430 741 Div. 12
OTS price $4.60

Boeing Co., Seattle, Wash.
WINGS III.
Monthly summary rept. no. 5.
13 Feb 64, 44p. Document no. 2 15472 10
Contract AF04 647 757
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Performance (Engineering)), Test vehicles, Tests, Launching, Power supplies, Environmental tests, Survival, Handling, Control systems, Scheduling, Processing, Checkout procedures, Military requirements, Maintenance, Guided missile components, Operation, Experimental data, Data, Air Force.

This report is the test summary for the period 1-31 January 1964. It defines major test requirements, their degree of attainment, major program problems encountered and recommendations which may improve or accelerate the test program. It is not the purpose of this document to describe in detail each test performed, but rather, to report in general terms, the major test operations scheduled during the period, and to describe briefly the manner in which the program has progressed. Test Operations referenced in this report are defined in the Wing III Engineering Test Operations Plan, Document D2-15461-1, and operations performed during rhe receipt-through-launch processing of FTM 770 are identified in the Wing III Test Operations Plan, Document D2-15462-1. Test requirements applicable to test operations performed to date are indicated in Section 7.0, Wing III Test Requirements Status. (Author)

AD-430 745 Div. 12
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
ANTENNA LOOK ANGLES AND POWERED FLIGHT TRAJECTORY RESTORATION FROM MISSILE RADIO GUIDANCE OBSERVATIONS AT PMR,
by J. W. Powers. 15 Jan 64, 36p. Rept. no. TDR269 4304 1
Contract AF04 695 269
SSD TDR63 292 Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Exterior ballistics), Guided missile ranges, Launching sites, Data processing systems, Acceleration, Radio homing, Guidance, Equations, Transformations (Mathematics).

A method of estimating ballistic missile attitude during the powered-flight period from track and rate observations recorded at the Mk II Complex at PMR is contained herein. The method, which consists of differentiating smoothed velocity data to obtain the total missile acceleration vector in inertial space, permits one to solve for the thrust acceleration vector, which on the average for all but near-instantaneous angular velocities is considered coincident with the roll axis of a roll-stabilized missile. From missile attitudes and accelerations, antenna look angles may be obtained for analysis of ground-to-airborne tracking during powered flight. (Author)

AD-430 863 Div. 12
OTS price $3.60

Sperry Gyroscope Co., Great Neck, N. Y.
DORMANT MISSILE INERTIAL GUIDANCE AND CONTROL SYSTEM PHASE I STUDY PROGRAM,
July 63, 32p. Rept. no. AB1210 0010 4
Contract AF04 694 346
Unclassified report

Descriptors: (*Accelerometers, Inertial guidance), (*Inertial guidance, Guided missiles), (*Guided missiles, Inertial guidance), Elasticity, Geometric forms, Measurement, Time, Tests, Stability, Feasibility studies, Models (Simulations), Control systems, Acceleration, Equations, Velocity, Errors, Calibration, Probability, Temperature, Damping, Torque, Noise, Rotation.

The results of a test program on a Rotating Pendulum Accelerometer (RPA) to determine its applicability to the Dormant Missile Inertial Guidance and Control System are presented. Test were performed primarily to determine stability and quick starting characteristics. The feasibility model originally fabricated was modified to attain the degree of quality expected of future models. The tests demonstrated feasibility, and performed in the manner predicted, showing the following characteristics: low noise, stability required by dormant system, ability to start quickly, and capability of perfect temperature compensation. (Author)

AD-430 935 Div. 12, 23
OTS price $19.75

Boeing Co., Seattle, Wash.
TRAINING EQUIPMENT LIST FOR WS-133A WEAPON SYSTEMS.
30 Dec 63, 334p.
Contract AF04 647 580
Unclassified report

Descriptors: (*Training devices, Guided missile simulators), (*Guided missile simulators, Training devices), Training, Training gear, Maintenance, Transporter-erectors, Silos, Power supplies, Motor generators, Launching, Control systems, Guided missile launchers, Guided missiles (Surface-to-surface), Air Force, Reentry vehicle, Ground support equipment, Electronic equipment, Models (Simulations), Simulation.

AD-431 005 Div. 12, 30, 26
OTS price $6.60

Space Systems Div., Air Force Systems Command, Inglewood, Calif.
PROGRAM 624A. GROUND EQUIPMENT REQUIREMENTS

GENERAL SPECIFICATION.
1 Nov 62, 66p.
SSD 62 128 Unclassified report

Descriptors: (*Launch vehicles (Aerospace), Ground support equipment), (*Ground support equipment, Acceptability), Specifications, Military requirements, Standards, Quality control, Design, Performance (Engineering), Research program administration, Test equipment, Checkout equipment.

This specification establishes the design, performance, and acceptance test requirements for all ground system equipment for the Standard Space Launching System (SSLS). (Author)

AD-431 006 Div. 12, 26, 30, 27
OTS price $1.60

Space Systems Div., Air Force Systems Command, Inglewood, Calif.
PROGRAM 624A LAUNCH COMPLEX ACCEPTANCE REQUIREMENTS.
1 Nov 62, 8p.
SSD 62 129A 1 Unclassified report

Supersedes issue of 1 July 62.

Descriptors: (*Launching sites, Acceptability), Checkout procedures, Guided missile personnel, Military requirements, Data, Specifications, Test equipment, Visual inspection, Launch vehicles (Aerospace).

This document defines the policies and data requirements for acceptance of the Program 624A launch complexes at AMR, provides guidance and direction to establish the composition, authority and method of operation of acceptance teams. It defines contractor responsibilities in the preparation for and conduct of acceptance checkouts for launch complexes and technical facilities. (Author)

AD-431 032 Div. 12, 6, 30
OTS price $14.00

Minneapolis-Honeywell Regulator Co., St. Peterburg, Fla.
GROUND SUPPORT SYSTEM SPECIFICATION (TEST OPERATION PLAN) VOLUME I, PART II. MAINTENANCE ANALYSIS SPECIFICATION (TEST OPERATION PLAN), by I. G. Rohlfs. 19 July 61, rev. 20 Sep 61, 209p. MH Aero Document no. 1179 R ED 21065, Rev. A
Contract AF33 600 42569
Unclassified report

Descriptors: (*Boost-glide vehicles (Aerospace), Inertial guidance), (*Ground support equipment, Specifications), (*Inertial guidance, Maintenance), Logistics, Design, Maintenance equipment, Maintenance personnel, Tests, Test methods, Checkout procedures, Checkout equipment, Guidance, Transportation, Handling, Operation, Acceptability.

This Maintenance Analysis Specification (Test Operation Plan), Volume I, Part II of the Dyna Soar (Step I) Program, ''Ground Support System Specification (Test Operation Plan)'', presents the maintenance requirements of the Dyna Soar (Step I) Primary Guidance Subsystem (PGS). The operational support requirements of the PGS are presented in the Operational Ground Support Equipment System Specification (Test Operation Plan) (OGSESS), Volume I, Part I of this document. The maintenance requirements presented are based on the support needs of the Primary Guidance Subsystem (PGS) and the operational support equipment. The elements of the PGS shall include the Inertial Guidance Subsystem (IGS), the Secondary Attitude Reference Subsystem (SARS), and the Guidance Malfunction Detection Subsystem (GMDS). The Primary Guidance Subsystem Associate Contractor (PGSAC) will furnish all the elements of the PGS and the Associated Aerospace Ground Equipment (AGE) (Author)

AD 431 033 Div. 12
OTS price $7.60

Minneapolis-Honeywell Regulator Co., St. Petersburg, Fla.
GROUND SUPPORT SYSTEM SPECIFICATION (TEST OPERATION PLAN), VOLUME I, PART I, by I. G. Rohlfs. 10 Jul 61, 72p. MH Aero Document 1179R ED21065, Rev. A
Contract AF33 600 42569
Unclassified report

Descriptors: (*Boost glide vehicles, Inertial guidance), (*Inertial guidance, Checkout procedures), Military requirements, Ground support systems, Electronic equipment, Test methods.

The chronological sequence is presented of operational support events that must occur from delivery of the Primary Guidance Subsystem (PGS) throughout the complete cycle of employment of the Primary Guidance Subsystem as an integrated part of the Glider vehicle in the Air Launch and Ground Launch Test Programs. (Author)

AD-431 107 Div. 12, 18, 27
OTS price $6.60

Space Systems Div., Air Force Systems Command, Inglewood, Calif.
PROGRAM 624A. SYSTEM FUNCTIONAL ANALYSIS SPECIFICATION.
1 Nov 62, 70p.
SSD 62 169 Unclassified report

Descriptors: (*Launch vehicles (Aerospace). Military requirements). Scheduling, Acceptability, Operations research, Analysis, Operation, Specifications, Research program administration, Functional analysis.

This specification establishes the requirements for the accomplishment and use of a systematic functional analysis in Program 624A. The studies conducted in accordance with this specification will serve to identify and interrelate the functional requirements of the elements of the system. The elements to be studied are the Standard Space Launch Vehicle (SSLV). the ground equipment, facilities, personnel and procedures required by SSD Exhibit 62 126 and subsidiary documents to achieve mission objectives. This specification includes the requirements for the sequencing, general methodology, and tools to be used in accomplishing the analysis and the requirements for presenting the data that represent the final result including documentation of tradeoffs and their relation to the affected program areas. The analysis specified shall satisfy the requirements of Appendices A and B of MIL-D-9412D for Program 624A. (Author)

AD-431 108 Div. 12, 26, 30
OTS price $6.60

Space Systems Div., Air Force Systems Command, Inglewood, Calif.
PROGRAM 624A. ENVIRONMENTAL REQUIREMENTS SPECIFICATION.
1 Nov 62, 70p.
SSD 62 166 Unclassified report

Descriptors: (*Launch vehicles (Aerospace). Environmental tests). Acceptability, Design, Life expectancy, Production, Launching, Guided missile components, Military requirements, Handling, Transportation, Storage, Compatibility, Mechanical properties, Checkout procedures, Captive tests, Test methods, Flight testing, Space environmental conditions, Documentation, Specifications, Military publications.

This specification establishes the minimum environmental design requirements for the Standard Space Launching Vehicle (SSLV) and the minimum test requirements and procedures for qualification, acceptance and production monitoring testing of all vehicleborne equipment. The design requirements and test conditions specified shall be reflected in applicable detailed model and equipment specifications. Procedures for life tests, test-to-failure and other special tests required by contract shall be based on the prescribed conditions. (Author)

AD-431 150 Div. 12, 26, 27, 13
OTS price $2.60

Space Systems Div. Air Force Systems Command, Inglewood, Calif.
PROGRAM 624A. FACILITY REQUIREMENTS GENERAL SPECIFICATION.
1 Nov 62, 30p.
SSD 62 130 Unclassified report

Supersedes Issue of 1 July 62.

Descriptors: (*Launching sites, Specifications), (*Launch vehicles (Aerospace), Launching sites), Military requirements, Configuration, Geophysics, Design, Human engineering, Maintainability, Life expectancy, Contamination, Standardization, Quality control, Reliability, Transportation, Handling, Launching, Ground support equipment, Guided missile components, Operation, Acceptability.

The purpose of this research is to define the general configuration and facility system requirements. This specification shall serve as the top facility requirements specification and shall provide a basis for the generation of detailed facility design criteria and concepts to be prepared jointly by the system integration contractor and the Architect-Engineer contractor from inputs supplied by the Associate Contractors. (Author)

AD-431 152 Div. 12, 26, 18
OTS price $2.60

Space Systems Div., Air Force Systems Command, Inglewood, Calif.
PROGRAM 624A. ACTIVATION REQUIREMENTS GENERAL SPECIFICATION.
by J. S. Bleymaier. 1 Nov 62, 28p.
SSD 62 129 Unclassified report

Descriptors: (*Launching sites, Military requirements), (*Launch vehicles (Aerospace), Launching sites), Specifications, Operation, Management engineering, Military facilities, Checkout procedures, Acceptability, Reliability.

This specification defines requirements for the activation of Standard Space Launching Systems (SSLS) launch complexes and technical facilities. The purpose of activation is to assure, through inspection, installation, checkout and acceptance, that the launch complexes and associated technical facilities are suitable to support the SSLS launch operations. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-429 796 Div. 13
OTS price $13.00

Pennsylvania State U., Coll. of Engineering and Architecture, University Park.
MEASUREMENT OF NATURAL DRAFT.
31 Dec 63, 189p.
Contract OCD OS62 64
Unclassified report

Descriptors: (*Cooling & ventilating equipment, Shelters), (*Shelters, Cooling & ventilating equipment), Gravity, Buildings, Temperature, Humidity, Gas flow, Instrumentation, Ventilation, Heat, Measuring devices (Electrical & Electronic), Physical properties.

Various methods for determining air change rates in a building space are critically investigated, and tentative conclusions are drawn from the data. Several buildings are used for the determination of air change rates in potential shelter spaces by gravity circulation alone. The buildings vary in size, use and configuration, and air circulation paths are changed in each building in an effort to determine optimum conditions for gravity ventilation. An experimental test facility is used to check out and refine instrumentation, equipment, and prodedures. (Author)

AD-430 193 Div. 13, 33
OTS price $2.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
TRAFFICABILITY IN SNOW TRENCHES,
by Gunars Abele. Feb 63, 23p.
Proj. 5010 02205, Task 8S66 02 001 02
CRREL TR88 Unclassified report

In cooperation with Denver Univ., Colo., Contract DA11 190ENG55.

Descriptors: (*Snow, Trafficability), (*Roads, Snow), Tests, Hardness, Surfaces, Underground structures, Snow vehicles, Railroads, Railroad tracks, Compressive properties, Aging (Materials), Failure (Mechanics).

During the 1960 Greenland test season, a study was made on the trafficability of snow-trench floors, including rail traffic on a natural snow floor and heavy wheel-load traffic on both natural snow and snow processed by a Peter snow miller. The effect of aluminum landing mats and a neoprene-coated nylon membrane was investigated. It was found that a natural-snow trench floor is not capable of supporting heavy, standard wheel-load traffic. The processed-snow floor is capable of supporting 7000-lb wheel loads for at least 500 coverages without any indications of failure or surface wearing. The use of landing mats appears to be unnecessary, and the membrane as a wearing surface is unsuitable because of its slippery surface. The natural snow floor is capable of supporting mine rail traffic and may be able to support a full-size railroad system, but further study is necessary. Investigation is also needed on heavy wheel-load traffic in a curved trench and at a higher speed. (Author)

AD-430 425 Div. 13
OTS price $4.60

Massachusetts Inst. of Tech., Cambridge.
THE CONSOLIDATION OF NON-HOMOGENEOUS CLAY LAYERS. PART II. ANALYTICAL SOLUTIONS,
by Robert L. Schiffman and Robert E. Gibson.
July 63, 46p. Research rept. no. R63 37b
Contract Nonr184129
Unclassified report

Descriptors: (*Soil mechanics, Theory), (*Clay, Physical properties), Permeability, Compressive properties, Mathematical analysis, Differential equations, Bessel functions, Transformations (Mathematics), Polynomials, Pressure, Stresses, Fourier analysis.

The Terzaghi theory of consolidation assumes that the permeability and compressibility of the clay layer is constant throughout the process of compression. The theory and analyses developed in this series of reports allow for physical non-homogeneities within the clay layer in the respect that the compressibility and permeability may vary with depth. This report presents the details of the mathematical techniques necessary to achieve analytical solutions to the theory. (Author)

14. MATERIALS (NON-METALLIC)

AD-429 353 Div. 14, 30
OTS price $1.60

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
DEVELOPMENT OF A FOUR-BALL WEAR TEST METHOD FOR LUBRICATING GREASES,
by Leon Stallings. 9 Jan 64, 14p.
NAEC AML 1849 Unclassified report

Descriptors: (*Greases, Wear resistance), (*Wear resistance, Test equipment), Lubrication, Test methods, Steel.

Based on test results and a statistical analysis it was concluded that the Four-Ball Wear Test represents a satisfactory method for laboratory studies covering wear preventive properties of lubricating greases. (Author)

AD-429 476 Div. 14, 22
OTS price $2.60

Army Frankford Arsenal, Philadelphia, Pa.
FUNGUS RESISTANCE OF SILICONE RUBBER POTTED FIRING MODULES,
by S. H. Ross. Dec 63, 18p.
DA Proj. 1H024401A110
AFA MR M64 17 1 Unclassified report

Descriptors: (*Embedding substances, Plastics), (*Plastics, Fungus deterioration), (*Fungicides, Effectiveness), Silicone plastics, Isocyanate plastics, Aromatic compounds, Metalorganic compounds, Salts, Copper compounds, Coatings, Chlorine compounds, Phenols, N-heterocyclic compounds, Polycyclic compounds.

Silicone rubber potted firing modules were found to be very susceptible to fungus growth. Two fungicides, copper-8-quinolinolate and p-chloro-m-xylenol, were incorporated into coatings with and without added red pigment. The coatings containing 2% p-chloro-m-xylenol were ineffective, whereas coatings containing 0.25% of solubilized copper-8-quinolinolate were effective in preventing fungus growth but showed some blooming of the fungicide on the coating. Polyurethane was evaluated as a material for possible future use in the design of firing modules. A concentration of 2% p-chloro-m-xylenol was ineffective in preventing fungus growth on the polyurethane, while a concentration of 0.25% copper-8-quinolinolate prevented the development of fungus growth but evidenced some blooming of the fungicide. (Author)

AD-429 490 Div. 14, 13
OTS price $3.60

Forest Products Labs., Madison, Wis.
PRESTRESSED LAMINATED WOOD BEAMS,
by Billy Bohannon. Jan 64, 32p.
FPL RP8 Unclassified report

Descriptors: (*Beams (Structural), Wood), (*Wood, Laminates), Reinforcing materials, Steel, Cables (Mechanical), Stresses.

This paper presents a comparative evaluation of the flexural strength of 25 pairs of prestressed and matching unprestressed control beams, an evaluation of beams with clear straight-grained tension laminations, and a method of matching pairs of beams of structural size. Results show that an immediate 31% increase in strength and approximately 50% decrease in variability of strength can be obtained by prestressing, that a clear outer tension lamination probably has more influence upon flexural strength than is recognized by present design methods, and that structural size beams can be successfully matched. (Author)

AD-429 527 Div. 14, 25
OTS price $3.60

Watervliet Arsenal, N. Y.
ALPHA CLASSIFICATION OF MICROFIBERS - PART IV,
by M. A. Sadowsky and M. A. Hussain. Oct 63, 30p.
Proj. IF5 23801A289 01
WVT RR6317 Unclassified report

Descriptors: (*Composite materials, Elasticity), (*Fibers, Mathematical analysis), Mathematical models, Equations, Stresses, Shear stresses, Tensile properties, Compressive properties, Deflection, Moments, Matrix algebra.

The delta-ring was put through the acceptance test with alpha = 3, and a linear inextensible, elastically flexible fiber was formed in the result. (Author)

AD-429 540 Div. 14, 16
OTS price $1.60

Walter Reed Army Inst. of Research, Washington, D. C.
CYANOACRYLATE ADHESIVES,
by George Brandes. Dec 63, 9p.
Proj. 3A012501A802
WRAIR TR6316 Unclassified report

Descriptors: (*Adhesives, Polymers), (*Polymers, Adhesives), (*Acrylic resins, Adhesives), Tissues (Biology), Rats, Synthesis (Chemistry), Polymerization, Bonding, Chemical analysis, Aluminum, Esters, Nitriles.

The series of alpha cyanoacrylate esters, methyl, ethyl, butyl, hexyl, octyl and decyl have been synthesized by thermally cracking the condensation products of formaldehyde with the respective cyanoacetates. The adhesive qualitiesof these monomers were measure using aluminum discs and pork intestines. The monomers were also submitted for medical evaluation as tissue adhesives and for tissue acceptance in rats. (Author)

AD-429 731 Div. 14
OTS price $6.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
PYROLYTIC GRAPHITE - A STATUS REPORT,
by A. M. Garber, E. J. Nolan and S. M. Scala. Oct 63, 58p. Rept. no. R63SD84
Contract AF04 694 222
Unclassified report

Descriptors: (*Pyrolytic graphite, Reviews), (*Refractory materials, Pyrolytic graphite), Preparation, Crystal structure, Anisotropy, Thermal stresses, Oxidation, Reaction kinetics, Microstructure, Thermal expansion, Thermal conductivity, Elasticity, Tensile properties, Specific heat, Structural shells, Design, Theory.

It is the purpose of this paper to review the recent history of the development of pyrolytic graphite and its thermal, aerothermochemical, and structural properties with regard to its

application to hypersonic vehicles. Pyrolytic graphite is not really new since its discovery dates back to Thomas Edison, however, this class of refractory materials has been rediscovered recently because it possesses certain desirable properties at extremely high operating temperatures, including a high strength to weight ratio, low oxidation rate, and a low transverse coefficient of thermal conductivity. Consequently, a thorough investigation of the properties of pyrolytic graphite is being carried out. In addition, theoretical models are being developed so that its aerothermochemical and aerothermostructural behavior can be predicted with confidence for arbitrary hypersonic missions. (Author)

AD-429 832 Div. 14, 17, 1
OTS price $6.60

General Dynamics, Fort Worth, Tex.
STRENGTH OF BONDED STRUCTURAL COMPONENTS EXPOSED TO 325 F THRU 10,000 HOURS,
by C. H. Mooney, Jr. 28 Feb 61, 48p. Rept. no. SR D60 17
Contract AF33 657 11214
Unclassified report

Descriptors: (*Sandwich construction, High-temperature research), (*Sandwich panels, High-temperature research), (*Adhesives, High-temperature research), Jet bombers, Airframes, Aluminum alloys, Glass textiles, Phenolic plastics, Epoxy plastics, Nitrile rubber, Mechanical properties, Shear stresses, Compressive properties, Creep, Tables, Nomographs.

The approximate reduction in strength of bonded aluminum sandwich construction atter 10,000 hours at 325 F is as follows: (1) Flatwise tension strength 15%; (2) Flatwise compression strength-26%; (3) Flatwise compression modulus-26%; (4) Edgewise compression strength-23%; (5) Core shear strength-8%. Exposure to the atmosphere while at temperature results in oxidation of the core and core-to-metal adhesive and loss of strength. The metal-to-metal adhesive is not affected by exposure to the atmosphere at temperature. Exposure of sealed panels to temperature of 325 F has the beneficial effect of post curing the core resin and adhesives. Creep of the metal-to-metal adhesive does not exceed Military Spec. limitations. The materials have adequate strength to develop stresses above yield in the al faces and edgemembers of bonded sandwich construction. (Author)

AD-429 836 Div. 14
OTS price $1.10

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
REVISION OF LUBRICATION CHART,
by E. Jewell. 22 Jan 64, 2p.
NAEC AML 1863 Unclassified report

Descriptors: (*Specifications, Lubricants), (*Lubricants, Military requirements), Greases, Oils, Hydraulic fluids, Documentation, Airplane engine oils, Films, Solids.

A chart listing the military specification lubricants used in the operation, maintenance, and overhaul of military aircraft was prepared. The chart presents the operating temperature range general composition, intended use, limiting conditions and stock numbers for each lubricant listed. (Author)

AD-429 912 Div. 14, 1
OTS price $2.60

General Dynamics, Fort Worth, Tex.
MECHANICAL - TIRE RUB STRIP - DETERMINATION OF WEAR CHARACTERISTICS,
by J. H. Martinez. 23 Aug 61, 28p. Rept. no. FGT2735 Add. 1
Contract AF33 600 38975
Unclassified report

Descriptors: (*Landing gear doors, Protective coverings), (*Aircraft tires, Friction), Laminates, Glass textiles, Phenolic plastics, Silicone plastics, Wear resistance.

This test was conducted in order to acquire additional information in regard to Tire Rub Strip wear characteristics. Specifically, this information was: (1) to ascertain material and thickness of an insulator to back up a rub-strip pad to protect the main landing gear doors; (2) to determine the feasibly of riveting or bonding the back-up insulator to the rub-strip; (3) to determine the method of rub-strip attachment to the aircraft structure; and (4) to determine the effective life of the rub-strip plate. (Author)

AD-429 923 Div. 14, 25
OTS price $.75

Polymer Research Inst., U. of Mass., Amherst.
DYNAMIC BIREFRINGENCE OF POLYOLEFINS,
by K. Sasaguri and R. S. Stein. 21 Nov 63, 1v. TR 65
Contract Nonr3357 01, Proj. NR356 378
Unclassified report

Descriptors: (*Polyethylene plastics, Refractive index), (*Crystal structure, Polyethylene plastics), Optical properties, X-ray diffraction analysis, Deformation, Molecular structure, Polymers, Alkenes.

The use of the dynamic birefringence method was extended to the study of the relationship between structual changes and mechanical properties for polyethylene, atactic and isotactic polypropylene and polybutene-1. The phase angle between birefringence and strain was measured which permitted the resolution of the strain-optical coefficient into real and imaginary parts. The real and imaginary parts of the dynamic relaxation modulus were also measured and compared with the optical data. Results for the crystalline polymers were interpreted in terms of the two-stage mechanism of deformation, involving spherulite deformation followed by internal crystalline reorientation. For the atactic polymer, the viscoelastic flow of amorphous regions contributes to the birefringence. The temperature dependence of birefringence and stress is similar for this mechanism but not for the crystalline contribution. (Author)

AD-430 148 Div. 14, 13
OTS price $8.10

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
CAMP CENTURY MOVEMENT RECORD.
Rept. for Oct 60-May 62,
by R. W. Waterhouse, Wayne N. Tobiasson and Barratt G. Scott. May 63, 89p.
Task 8X66 021 001 02
CRREL TR121 Unclassified report

Descriptors: (*Snow, Mechanical properties), (*Structures, Snow), Motion, Measurement, Deformation, Polar regions.

Snow deformation studies are being made in the undersnow facilities at Camp Century on the N. Greenland Ice Cap to define the 'useful life' of such facilities. The initial measurements were made in Aug. 1959 and since then cross section measurement stations, settlement recording Helipots (helical potentiometers), and a camp bench mark system have been installed. Results through May 1962 are presented. Twenty-nine Helipots, installed on structures within the tunnels, record movement between the structure and the tunnel arch or floor. The horizontal and vertical distances between wooden pegs set in the tunnel walls at 19 stations to determine profile variations in the tunnel cross sections are measured periodically with a steel tape. Grid lines were painted on several side tunnel portals of various sizes and shapes and will be photographed periodically to determine patterns of deformation. The various Helipot installations are diagrammed and the relative movements recorded by each are graphed. The 19 tunnel cross sections being studied are also diagrammed and rates of closure at each station graphed, and the elevation variations of the bench marks with time are tabulated. (Author)

AD-430 159 Div. 14, 7
OTS price $1.60

Stanford Research Inst., Menlo Park, Calif.
THERMOELECTRIC MATERIALS.
Quarterly progress rept. no. 2, 8 July-8 Oct 63, by J. W. Johnson. 1 Nov 63, 14p.
Contract NObs88487, Proj. PAU4444; SR007 12 01
Unclassified report

Descriptors: (*Thermoelectricity, Liquids), (*Liquids, Semiconductors), Sulfides, Bismuth compounds, Copper compounds, Resistance (Electrical), Electrodes, Graphite, Laboratory furnaces, Melting.

The resistivities and Seebeck coefficients of the bismuth sulfide-cuprous sulfide system in the liquid state have been measured for melts containing 25, 50, and 75 mole percent bismuth sulfide. The Seebeck coefficient data support the view that the addition of a p-type liquid to an n-type liquid produces changes directly proportional to the amount of p-type material added. The resistivity data are not so simply explained and some speculations concerning the conduction process are proposed. (Author)

AD-430 181 Div. 14, 25, 15
OTS price $1.25

Research and Technology Div., Air Force Systems Command, Washington, D. C.
ANALYTICAL AND EXPERIMENTAL STUDY OF THE MECHANISMS OF MONOFILAMENT FIBER FRICTION. PART I. A MATHEMATICAL MODEL FOR ADHESION MECHANISM AND A GENERAL EQUATION RELATING FIBER FRICTION TO NORMAL LOAD.
Rept. for Sep 61-Feb 63, by James M. Whitney. Dec 63, 45p.
AF Proj. 7320, Task 732001
RTD TDR63 4127, pt. 1 Unclassified report

Report on Fibrous Materials for Decelerators and Structures.

Descriptors: (*Friction, Fibers (Synthetic)), (*Fibers (Synthetic), Tensile properties), Textiles, Elasticity, Stresses, Wear resistance, Shear stresses, Numerical analysis, Deformation, Nylon, Polyethylene plastics, Mathematical models.

Equations describing the relationship between frictional force and normal load for polymeric fibers (monofilaments) have been derived. Mathematical models describing the variation of area of contact with normal load were used to develop the friction equations. The equations were checked experimentally by moving monofilaments over a cylindrical surface and measuring the friction as a function of tension. The results were compared with data obtained by other workers in the field. Friction occurring between yarns at the intersection of warp and filling has substantial effect on the mechanical properties of fabrics, and may have considerable effect on stress-strain behavior. Therefore, it is necessary to take this friction into consideration in the engineering of a fibrous structure. (Author)

AD-430 258 Div. 14, 13
OTS price $2.60

General Dynamics/Fort Worth, Tex.
FACE WRINKLING AS A FUNCTION OF SURFACE WAVINESS, by C. W. Rogers. 6 May 63, 25p. Rept. no. ERR FW196
Contract AF33 657 11214
Unclassified report

Descriptors: (*Honeycomb cores, Sandwich panels), (*Sandwich panels, Compressive properties), Sandwich construction, Stresses.

An attempt was made to establish the correlation between surface waviness of honeycomb core panels and the face wrinkling attendant upon the panels when subjected to compressive forces. Tests were conducted with honeycomb sandwich edgewise compression specimens with controlled initial surface waviness. (Author)

AD-430 322 Div. 14, 1
OTS price $1.10

General Dynamics, Fort Worth, Tex.
FUSELAGE - WINDSHIELD - EXPOSURE TEST, by M. J. Carroll. 15 Jan 64, 4p. Rept. no. FTDM2949
Contract AF33 657 11214
Unclassified report

Descriptors: (*Windshields, Degradation), (*Degradation, Windshields), (*Aircraft equipment, Windshields), Transparent panels, Pigments, Glass, Jet bombers, Environmental tests.

With the installation of pigmented edge B-58 pilot enclosure windshields, the windshield replacement rate due to interlayer degradation decreased considerably. The use of pigmented edge glass was effective on A/C #57 and on. Airplanes No. 31 and 33, however, were retrofitted with new glass in order to conduct an inservice test. Data obtained so far show that the glass replacement rate is higher on A/C #57 and on than on A/C #31 and 33. This indicated that the first pigmented windshields received may have been better than the windshields later developed for production use. This test was conducted to establish a quality comparison between windshields now received and previously tested pigmented windshields. (Author)

AD-430 323 Div. 14, 1
OTS price $1.60

General Dynamics, Ft. Worth, Tex.
FUSELAGE - B-58 WINDSHIELD POLYMER B AS EXTENDED EDGE MATERIAL - EVALUATION OF -,
by H. C. Hoffmann. 15 Jan 64, 11p. Rept. no. FTDM2861
Contract AF33 657 11214
Unclassified report

Descriptors: (*Jet bombers, Windshields), (*Windshields, Degradation), (*Manufacturing methods, Aircraft equipment), Environmental tests, Humidity, Acids, Sulfur compounds, Oxides, Laminated glass, Fracture (Mechanics), Wear resistance, Bonding, Silicone plastics, Aging (Materials), Sealing compounds.

Tests were initiated as a result of preliminary work on simulated B-58 windshields which had shown (1) that Polymer B retarded the degradation of silicon Type K interlayer when exposed to moisture - SO2 - sunlight; and (2) that an extended postcure at elevated temperature also slowed degradation of the interlayer. Results of the Polymer B windshields showed that attempts to make a satisfactory windshield by this method were generally unsuccessful. Libbey-Owens-Ford did periphery disclosed that the Polymer B had not cured properly. Upon exposure of the windshield for 35.5 hours to moisture-SO2 - sunlight in a solarium, cracks appeared in the Type K interlayer near the edges of the panel. An attempt was made to determine burst pressure of the windshield at 260F. However, the glass separated almost intact from the edge attachment at a pressure of one to two psig. No further testing was conducted on this or the other Polymer B windshield. (Author)

AD-430 324 Div. 14, 10, 1
OTS price $2.60

General Dynamics, Fort Worth, Tex.
MATERIALS - CHANNEL SEALANTS - FOR USE IN F-111 INTEGRAL FUEL TANKS - SCREENING TESTS OF,
by J. P. Thomas. 15 Jan 64, 21p. Rept. no. FGT3041
Contract AF33 657 8260 1
Unclassified report

Descriptors: (*Jet fighters, Fuel tanks), (*Fuel tanks, Sealing compounds), Acceptability, Environmental tests, Silicone plastics, Polymers, Fluorine compounds, Synthetic rubber, Adhesion, Corrosion, Deformation, Temperature, Thermal expansion.

Eight channel sealants and one 50-50 mixture of two channel sealants were screened in accordance with the adhesion, low temperature flexibility, and reinjection properties tests of the proposed F-111 channel sealant specification. Although none of the candidate channel sealants tested passed all three screening tests without some qualifications, two materials appear to show promise as F-111 integral fuel tank sealants. (Author)

AD-430 325 Div. 14, 1
OTS price $1.60

General Dynamics, Fort Worth, Tex.
ENVIRONMENTAL CONTROLS - F-111 WINDSHIELD COATING EROSION - DEVELOPMENT TEST,
by R. A. Lee. 30 Sep 63, 15p. Rept. no. FGT3062A1
Contract AF33 657 8260 1
Unclassified report

Descriptors: (*Windshields, Moistureproofing), (*Coatings, Moistureproofing), (*Moistureproofing, Windshields), (*Aircraft equipment, Windshields), Transparent panels, Degradation, Air, Blast, Aircraft, Jet fighters, Environmental test, Silicone plastics, Erosion, Glass, Plastic coatings.

The purpose of this test was to determine what, if any, deterioration occurs in the rain-repellant characteristics of a silicone coating of Z4141 on glass when subjected to a sustained air blast of 400 knots velocity. Deterioration was determined by comparing still photographs made periodically during the test program looking through the glass during a simulated heavy rain. The rain-repellent characteristics of the Z4141 coating remained good after being subjected to two hundred hours of air blast at 400 knots velocity. A slight deterioration in the rain-repellent characteristics of the Z4141 coating was evident, but visibility remained good in a simulated heavy rain. (Author)

AD-430 326 Div. 14, 1
OTS price $1.10

General Dynamics, Fort Worth, Tex.
FUSELAGE - 4FTB333 - WINDSHIELD SPECIMENS - VARIABLE PIGMENTED EDGE BITES - SOLARIUM DETERIORATION TEST OF -,
by M. T. Carroll. 15 Jan 64, 5p. Rept. no. FTDM3104
Contract AF33 657 11214
Unclassified report

Descriptors: (*Jet bombers, Windshields), (*Windshields, Degradation), Environmental tests, Humidity, Acids, Sulfur compounds, Oxides, Laminated glass, Fracture (Mechanics), Silicone plastics, Wear resistance, Aircraft equipment.

Eighteen 4FTB333 windshield test specimens were received for solarium exposure testing. The specimens had pigmented edge depths ranging from 0.30 to 0.75 in. The 0.30 in. specimens are typical of the windshields now in service. Also included were control specimens which contained no pigmented interlayer. The specimens were placed in two solariums, 9 in each, and exposed to sunlight, 10% SO2, and humidity. Basing the service life of B-58 windshields on the time required for interlayer cracks to progress 2 in. in from the edge of the glass, increasing the pigmented interlayer depth will increase the service life of the windshield. In addition, an increase in the pigmented edge depth will also decrease the daylight opening of the windshield. (Author)

AD-430 328 Div. 14, 1
OTS price $1.10

General Dynamics, Fort Worth, Tex.
MATERIAL - SCREENING TEST OF FILLET AND FAYING SURFACE TYPE SEALANTS FOR F-111,
by J. M. Warren. 15 Jan 64, 8p. Rept. no. FTDM3125
Contract AF33 657 11214
Unclassified report

Descriptors: (*Fuel tanks, Seals (Stoppers)), (*Aircraft equipment, Fuel tanks), (*Sealing compounds, Fuel tanks), Jet fighters, Ad-

hesion, Hardness, Environmental tests, Aging (Materials), Test methods, Silicone plastics.

High performance characteristics of the F-111 airplane has made it necessary to search for integral fuel tank sealants which will withstand more severe environmental conditions. To minimize testing, candiąte sealants are being screened before more complex and costly evaluation tests are conducted. Results of screening tests on five sealants are reported. (Author)

AD-430 329 Div. 14, 1
OTS price $1.10

General Dynamics, Fort Worth, Tex.
MATERIAL - CORROSION PROTECTION COATINGS - FOR USE IN F-111 INTEGRAL FUEL TANKS - SCREENING TESTS OF,
by J. M. Warren. 15 Jan 64, 6p. Rept. no. FTDM3126
Contract AF33 657 11214 Unclassified report

Descriptors: (*Fuel tanks, Corrosion inhibition), (*Aircraft equipment, Fuel tanks), (*Protective treatments, Fuel tanks), Jet fighters, Environmental tests, Colors, Aging (Materials), Sea water, Aluminum, Coatings, Adhesion, Low-temperature research, Failure (Mechanics).

The performance and reliability requirements of the F-111 airplane necessitate the use of corrosion prevention coatings in the integral fuel tanks. The coatings investigated for this purpose must first be screened by a few selected tests, simulating the F-111 fuel tanks environment, in order to eliminate the inadequate materials from the more extensive and costly evaluation tests. The eight coatings and the test data listed in this report represent four test requests and were grouped together to facilitate reporting. (Author)

AD-430 351 Div. 14, 17, 25
OTS price $2.60

Michigan U., Coll. of Engineering, Ann Arbor.
SINTERING OF METAL OXIDES.
Final rept.,
by G. Parravano. Oct 63, 24p. Rept. no. 02832 16F
Contract AF49 638 493, Projs. 02832, 9762, Task 37621 Unclassified report

Descriptors: (*Metals, Sintering), (*Oxides, Sintering), (*Sintering, Theory), Crystals, Single crystals, Fibers, Spheres, Crystal growth, Surface properties, Diffusion, Solids, Chemical bonds, Reaction kinetics, High-temperature research, Transport properties, Vapor pressure, Heat of activation, Zinc compounds, Vanadium compounds, Titanium compounds, Platinum, Germanium, Nickel compounds, Distillation.

Some of the results obtained have been summarized in Technical Reports AFOSR TN 60-109, 60-1460, 59-184, and 59-481 and in publications listed. The oxides investigated include ZnO, TiO2, V2O5 and, in a qualitative fashion, NiO. The results on the sintering mechanism deduced from the experimental observations are tabulated. Whisker growth has been studied quantatively in the case of V2O5, but qualitative observations have been recorded for ZnO, TiO2, and NiO. The formation of flat facets and surface bands has been studied on TiO2. (Author)

AD-430 356 Div. 14
OTS price $3.60

Polymer Research Inst., U. of Mass., Amherst.
ON THE ORIENTATION MECHANISM OF CRYSTALLINE POLYMERS,
by R. S. Stein and K. Sasaguri. 4 Sep 63, 37p. Technical rept. 64
Contract Nonr335701, Proj. NR356 378 Unclassified report

Descriptors: (*Polyethylene plastics, Crystal structure), Refractive index, Deformation, Symmetry (Crystallography), Transformations (Mathematics), Mathematical models, Functions, Numerical analysis.

In this paper there is a detailed account of the orientation of individual crystal axes. The effect of chain unfolding on crystal rotation within the spherultie is considered. The model successfully accounts for the variation of birefringence and crystal orientation functions with elongation which is found experimentally. (Author)

AD-430 360 Div. 14
OTS price $1.00

Union Carbide Plastics Co., Bound Brook, N. J.
RESEARCH ON IMPROVED EPOXY RESINS,
by D. P. Norris, R. F. Sellers, and S. G. Smith. 1 Feb 64, 38p.
Contract Nonr4172 00X Unclassified report

Descriptors: (*Epoxy plastics, Casting), (*Mechanical properties, Epoxy plastics), Tensile properties, Compressive properties, Stresses, Phenols, Synthesis (Chemistry).

The purpose of this program is to define the correlation of novel diepoxide molecular configurations with the physical significant improvements in filament reinforced plastics for deep submergence structures. A discussion of the relationship of physical properties to molecular configuration and to the relative purity of representative sample resins is presented as interpreted from cast resin data obtained from diepoxides prepared under Phase I. Progress on the preparation of novel diepoxides to be tested under Phase II is described. (Author)

AD-430 362 Div. 14, 31
OTS price $3.60

Navy Electronics Lab., San Diego, Calif.
WIRE CABLES FOR OCEANOGRAPHIC OPERATIONS,
by J. C. Thompson and R. K. Logan. 13 Nov 63, 240p.
NEL ER1199 Unclassified report

Descriptors: (*Cables (Mechanical), Underwater), (*Electric cables, Underwater), (*Oceanographic equipment, Cables (Mechanical), Wire, Underwater equipment, Steel, Stainless steel, Tin alloys, Copper alloys, Mechanical properties, Elasticity, Corrosion, Abrasives, Tables.

Extensive tests were conducted on 14 cables, now in general use for marine operations, to determine their resistance to elastic and rotational stretch. The 3 x 19 cable was found to have characteristics that would favor its use for sensitive oceanographic problems when compared with the other cables tested. (Author)

AD-430 442 Div. 14, 7
OTS price $3.60

Columbian Carbon Company, Princeton, N. J.
CARBON BLACK FOR ORGANIC DEPOLARIZER BATTERIES
Quarterly progress rept. no. 1, 1 July 63-30 Sep 63,
by M. T. Johnston and J. E. Smith. 30 Sep 63, 31p.
Contract DA36 039AMC03239E, Proj. 1G6 22001A053
Unclassified report

Descriptors: (*Carbon black, Production), (*Cathodes (Electrolytic cells), Carbon black), (*Dry cells, Theory), Furnaces, Physical properties, Particle size, Surface properties, Chemical properties, Electric conductance, Crystal structure, Batteries & components, Manufacturing methods, Magnesium, Polarization, Nitrobenzenes, Anodes (Electrolytic cells), Magnesium compounds, Perchlorates, Electrolytes.

This report presents the theory of the meta-dinitrobenzene-depolarized magnesium dry cell, the role of carbon black in its performance, and a review of previous work toward development of a suitable black. Also presented is a process development program including descriptions of the furnaces to be used and the variables to be studies. The various physical and chemical characterization tests to be performed on the black are discussed. Finally, equipment and procedures for cell fabrication and testing are described. Repeatability of Columbian's cell fabrication technique has been established. (Author)

AD-430 459 Div. 14, 4
OTS price $2.60

Wyandotte Chemicals Corp., Mich.
SYNTHESIS OF LOW TEMPERATURE OIL RESISTANT URETHANE ELASTOMERS.
Quarterly progress rept. no. 5, 1 Oct-31 Dec 63. 31 Dec 63, 24p.
Contract DA20 018ORD24883
Unclassified report

Descriptors: (*Isocyanate plastics, Elastomers), (*Polymers, Elastomers), (*Elastomers, Synthesis (Chemistry)), Glycols, Low temperture research, Copolymerization, Alcohols, Ethers, Amines, Chlorine compounds, Organic nitrogen compounds, Aromatic compounds, Plasticizers, Water, Absorption, Mechanical properties, Tensile properties, Elasticity, Oils, Compatibility, Monocyclic compounds, Polycyclic compounds.

Cast elastomers were formulated from high molecular weight polyether polyols with dichlorobenzidine, toluene diisocyanate, and low molecular weight crosslinking triols, and evaluated for their physical properties, including oil resistance and low temperature flexibility. Samples were prepared which meet the low temperature modulus at -55 C. with tensile strength of 700-800 psi. Samples which meet the tensile requirements of 1200 psi hardened at -45 to -50 C. Trimethylol propane used as a crosslinking agent had less effect on low temperature modulus than glycerol. A high molecular weight polyether urethane plasticizer was not as effective as using a higher percent of polyether in one-shot formulations. (Author)

AD-430 503 Div. 14
OTS price $1.25

Forest Products Lab., Madison, Wis.
STRENGTH PROPERTIES OF REINFORCED PLASTIC LAMINATES AT ELEVATED TEMPERATURES (Narmco 534 Resin and 181-A1100 Glass Fabric),
by Kenneth H. Boller. Jan 64, 45p.
Contract AF33 657 63 358, Proj. 7381, Task 738103,
RTD TDR63 4091 Unclass

Report on Materials Application.

Descriptors: (*Heat resistant plastics, Mechanical properties), (*Laminated plastics, Mechanical properties), (*Glass textiles, Laminated plastics), Silicone plastics, Reinforcing materials, Stability, High temperature research, Tensile properties, Compressive properties, Shear stresses, Stresses, Tables, Nomographs.

Several reinforced plastic laminates that show promise of having good strength properties at elevated temperatures are being evaluated to determine their strength and elastic properties. This report presents properties of a phenylsilane laminate made of a formulation of resins and glass fabric. In general strength properties decreased with increases in temperature. Strengths dropped with the first application of heat, but at constant temperatures of 300 and 400 F., the exposed material showed a tendency to recover some of that lost strength. Continued exposure above 500 F., however, did not result in recovery of strength. From the curves and data, the environmental effects on individual strength properties may be judged separately for temperatures between 80 and 1,000 F. and exposure periods between 0.05 and 1,000 hours. (Author)

AD-430 504 Div. 14
OTS price $1.00

Forest Products Lab., Madison, Wis.
RESUME OF FATIGUE CHARACTERISTICS OF REINFORCED PLASTIC LAMINATES SUBJECTED TO AXIAL LOADING,
by Kenneth H. Boller. Dec 63, 32p.
Contract AF33 657 358, Proj. 7381, Task 738103
ASD TDR63 768 Unclassified report

Report on Materials Application.

Descriptors: (*Laminated plastics, Fatigue (Mechanics)), (*Fatigue (Mechanics), Laminated plastics)), Glass textiles, Loading (Mechanics), Reinforcing materials, Environmental tests, Humidity cabinets, Stresses, Epoxy plastics, Polyester plastics, Phenolic plastics, Heat resistant plastics, Silicon plastics, Test equipment, Failure (Mechanics), Tensile properties.

This report presents a brief summary of fatigue investigations to evaluate the basic fatigue characteristics of typical reinforced plastics laminates. The majority of the evaluations were made to assay material variables such as resins and reinforcements; however, some evaluations were made to determine effects of environments, surface conditions, and loading variables. Fatigue data between 1/4 cycle and 10-million cycles show a wide spread in strength values at the 1/4 cycle, but the spread narrows considerable at 10-million cycles. Values of fatigue strength at 10-million cycles vary from 4,000 pounds per square inch for laminates reinforced with glass mat to 40,000 pounds per square inch for laminates reinforced with unwoven glass fibers. (Author)

AD-430 512 Div. 14
OTS price $1.10

General Dynamics, Fort Worth, Tex.
ROPE - NYLON AND MYLAR - TENSILE PROPERTIES-

STATIC AND VIBRATIONAL,
by F. W. Weber. 15 Jan 64, 10p. Rept. no. FTDM3159
Contract AF33 657 11214
Unclassified report

Descriptors: (*Cordage, Mechanical properties), (*Polyester plastics, Cordage), (*Nylon, Cordage), Tensile properties, Stresses, Tables, Vibration, Torque, Damping.

AD-430 514 Div. 14, 17
OTS price $1.10

General Dynamics, Fort Worth, Tex.
MATERIAL - ADHESIVES - AF-130, METLBOND 329, AND FMS-0015-1 - DETERMINATION OF CREEP RESISTANCE OF,
by J. P. Thomas. 15 Jan 64, 10p. Rept. no. FTDM3160
Contract AF33 657 11214
Unclassified report

Descriptors: (*Stainless steel, Sandwich panels), (*Bonded joints, Creep), Adhesives, Beams (Structural), Deformation, Temperature, Loading (Mechanics).

Temperature-load conditions which would be placed upon adhesive bonded aluminum structures for use on the F-111 airplane in certain high temperature areas, has raised a question as to whether the permanent set of aluminum bonded sandwich components determined in previous tests is due primarily to the 2024 T-81 aluminum skins and 5052 aluminum alloy core or adhesive. If this can be determined, action can be taken to improve the structure in these high temperature areas. The purpose of these tests was to determine the permanent set on stainless steel beams with stainless steel core at 350 F under load. The permanent deformation of stainless steel sandwich beams at 350 F under load was determined, and based upon the results of this test, the core and skins of aluminum structures is considered a greater contributing factor to permanent deformation than the adhesive material. (Author)

AD-430 569 Div. 14
OTS price $1.10

West Virginia Pulp and Paper Co., New York.
ADSORPTION - DESORPTION PROPERTIES OF SORBENTS.
Bimonthly progress rept. no. 1, 19 Nov 63-18 Jan 64,
by A. W. Loven and F. J. Vermillion. 3 Feb 64, 4p.
Contract DA18 035AMC106A
Unclassified report

Descriptors: (*Adsorption, Materials), Carbon, Oxygen, Surface properties, Sorption, Laboratory equipment.

Progress is reported in the following areas of endeavors: (1) Construction of both valumetric and gravimetric adsorption apparatus; (2) A literature survey of activated carbon fibers and related activated polymer carbons; and (3) The application of chemical methods for the characterization of surface oxygen complexes on activated carbon. (Author)

AD-430 649 Div. 14
OTS price $5.60

Radiation Applications, Inc., Long Island, N. Y.
DEVELOPMENT OF TRANSPARENT PLASTIC MOISTURE BARRIERS BY RADIATION-INDUCED GRAFT POLYMERIZATION.
Final rept., 1 Sep 62-31 Aug 63, 5 Sep 63, 52p. Rept. no. 327
Contract NOw63 0134c
Unclassified report

Descriptors: (*Polyethylene plastics, Moistureproofing), (*Moistureproofing, Packing materials), (*Polymerization, Radiation chemistry), Chlorine compounds, Fluorine compounds, Bromine compounds, Gamma rays, Ultraviolet radiation, Crystal structure, Halogenated hydrocarbons, Halocarbon plastics, Photochemistry, Halogenation.

Grafting of various monomers to polyethylene for the purpose of improving moisture barrier properties of the polymer has been studied. Monomers employed were, primarily, vinylidene chloride, chlorotrifluoroethylene and bromotrifluoroethylene. Some co-grafting with vinylidene chloride and other monomers was also performed. Grafting was primarily initiated by gamma irradiation; some studies with ultraviolet and chemical initiation were undertaken. The moisture barrier properties were improved by ca. 50% with a high vinylidene chloride graft, with a low vinylidene chloride graft prepared in the presence of chain regulator, and with a vinylidene chloride copolymer graft (all prepared by gamma irradiation). Grafting of chlorotrifluoroethylene could be performed, but the WVTR decreased with increased grafting levels. (Author)

AD-430 691 Div. 14, 13
OTS price $5.60

University Coll., Galway (Ireland).
IMPACT RESISTANCE OF PLAIN, REINFORCED AND PRESTRESSED CONCRETE BEAMS.
Final technical rept., 1 Sep 62-1 Sep 63,
by J. D. O'Keeffe. 1 Sep 63, 56p.
Contracts DA91 591EUC2483, DA91 591EUC1823 and DA91 591EUC1499
Unclassified report

Descriptors: (*Reinforced concrete, Beams (Structural)), (*Beams (Structural), Concrete), (*Concrete, Beams (Structural)), Impact shock, Structural properties, Stresses, Loading (Mechanics), Deformation, Test methods, Test equipment, Steel, Mathematical analysis, Deflection, Energy, Machines, Vibration.

A new and larger testing machine was built capable of taking beams of span up to 54in. Strikers of three different weights were used with centre-point and two-point symmetrical loading systems. An extensive range of reinforced concrete beams was tested and the results of the various measurements were analysed. Conclusions are reported. A new method of analysis to permit the computation of equivalent static loads was developed. The method, called the Area-Energy method assumes that for the duration of one impact the moment of inertia and elastic modulus are constant but makes no assumptions about the variation of these quantities from one impact to the next. The method is also applicable to impact tests on steel bars, etc. Findings suggest that the amount of top steel necessary to prevent cracking on the top face of beams due to vibration is independent of the striker weight and that the amount provided need not exceed half the amount of bottom steel. (Author)

AD-430 727 Div. 14, 26
OTS price $1.60

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
SEALS FOR 12,500 PSIG AIR SYSTEMS.

Progress rept. no. 2,
by A. E. Barrett. 19 Feb 64, 16p.
Proj. S F013 13 01, Task 907
MINS 28 12 Unclassified report

Descriptors: (*Rubber seals, Pneumatic devices), (*Seals (Stoppers), Pneumatic devices), (*Pneumatic systems, Rubber seals), Test methods, Halocarbon plastics, Air, Pressure, Deformation, Aging (Materials), Oxygen.

The ability of Viton B O-ring of 90 Shore A hardness to seal 12,500 psig air pressure was evaluated under dynamic and static simulated-service conditions using solid Teflon back-up rings. Both dynamic and static seals showed small volume leakage after total elapsed times under pressure ranging from 35 to 58 hours. The O-rings showed no defects or evidence of extrusion after test. Leakage may have been due to slow recovery of the O-rings from compression, microscopic defects in the metal and/or rubber surfaces, or to the presence of small particles of compressed Molykote powder, the lubricant used on the O-rings. The rate of leakage was much less than previously reported for similar tests using spiral Teflon back up rings. The swelling of the O-rings caused by sudden release of pressure was low, for example: 1.2% after 1,000 psig pressure and 3.6% after 12,500 psig pressure. The measurements were made one hour after pressure release. The physical properties of Viton B O-rings were not greatly affected by six months exposure to oxygen at 60 F and 1,750 pressure. (Author)

AD-430 744 Div. 14, 1
OTS price $8.10

United States Rubber Co., Detroit, Mich.
DEVELOPMENT OF MANUFACTURING METHODS TO PRODUCE HIGH TEMPERATURE AIRCRAFT TIRES. LITERATURE SURVEY.
Suppl. to final technical rept.,
by S. van der Burg. 18 Feb 64, 85p.
Contract AF33 600 42970, Proj. 7 913
RTD TR63 7 013 Unclassified report

Descriptors: (*Aircraft tires, Manufacturing methods), (*Manufacturing methods, Bibliographies), (*Heat resistant plastics, Aircraft tires), Rubber.

A literature survey was made of materials and processes currently available and suitable for use in developing high temperature tires. The literature was surveyed for high temperature properties, heat resistance and for the effect of compounding changes on these properties of natural rubber, styrene-butadiene copolymers, butadiene-acrylonitrile copolymers, neoprene, butyl and modified butyls, acrylate rubbers, carboxylic rubbers, ''adduct rubbers'', ethylene propylene rubbers, Hypalon, polyurethane rubbers, fluoro rubbers, silicone rubbers, organo tin elastomers and nitroso polymers. High temperature testing equipment and techniques, evaluation of elastomers for high temperature tires, and their design construction and testing were also reviewed. (Author)

AD-430 753 Div. 14, 27
OTS price $8.10

Alpha Div., Thiokol Chemical Corp., Huntsville, Ala.
NOZZLE EVALUATION.
Quarterly interim technical rept. 22 June-21 Sep 63.
24 Feb 64, 88p. Rept. no. 9 64
Contract DA01 021ORD11919
Unclassified report

Descriptors: (*Rocket motor nozzles, Materials), (*Nozzle inserts, Materials), (*Ceramic materials, Nozzle inserts), Pyrolytic graphite, Fourier analysis, Heat transfer, Ablation, Mathematical models, Mathematical analysis, Rocket motors (Solid propellant), Energy, Titanium compounds, Boron compounds, Nitrogen compounds, Erosion, Temperature, Distribution.

This quarterly report describes progress made during the period 22 June through 21 September 1963 on the program to evaluate experimental rocket motor nozzles produced under the Army Materials Research Agency Program. During this period, the Army Missile Command (AMICOM) delivered to Thiokol Chemical Corporation one Atlantic Research 2-in. pyrolytic graphite coated nozzle insert and two titanium boronitride Calorobic 1-in. nozzle inserts, numbered HTB-3 B 109 and HTD-3 A 7, respectively. AMICOM has approved the use of the TX-24 motor to test the 1-in. nozzles at chamber pressures of 700 psi or lower. The TX-338 test motor will be used for testing 1- or 2-inch nozzle inserts at chamber pressures exceeding 700 psi. Two test plans, A and B, were submitted by Thiokol to AMICOM for AMRA's consideration. Test Plan A was a comprehensive plan which included pretest and post-test evaluations of the nozzle insert. Test Plan B was submitted basically as a go-no-go type test in which the insert would be shipped to Watertown Arsenal for evaluation after the test. (Author)

AD-430 754 Div. 14, 12
OTS price $3.60

Aerojet-General Corp., Sacramento, Calif.
DEVELOPMENT OF IMPROVED RESIN SYSTEMS FOR FILAMENT-WOUND STRUCTURES.
Bimonthly progress rept. no. 4, 10 Nov 63-10 Jan 64,
by J. J. Cooney. 12 Feb 64, 36p. Rept. no. 0627 VI4
Contract NOw63 0627c, Task 6
Unclassified report

Descriptors: (*Filament wound construction, Aging (Materials)), (*Epoxy plastics, Aging (Materials)), (*Aging (Materials), Epoxy plastics), Amines, Phthalates, Plasticizers, Copolymaization, Mechanical properties, Tensile properties, Stresses, Shear stresses, Hardness, Phase studies, Tables, Aromatic compounds, Anhydrides.

This report contains the statistical analysis of data from tests for dynamic shear modulus, Poisson's ratio, and Izod impact strength (re-analysis) performed on systems cured with m-phenylenediamine. Also reported is the statistical analysis of data obtained on the systems cured with 4,4'-methylenedianiline in tests for the following properties: tensile strength, elongation, and modulus; Barcol hardness; Izod impact strength; density; heat-distortion temperature; and tensile tear strength. Mechanical tests were performed on systems cured with ethylenediamine and hexahydrophthalic anhydride. Preparation of castings required for this program was completed. Testing of 240 specimens is now in progress. (Author)

AD-430 759 Div. 14
OTS price $1.60

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
EFFECT OF SHELF AGING ON MIL-P-5516 O-RINGS.

Progress rept. no. 5,
by A. E. Barrett. 24 Feb 64, 11p.
Proj. SF013 12 01, Task 907
MINS 92 18 Unclassified report

Descriptors: (*Rubber, Gaskets), (*Gaskets, Storage), Degradation, Aging (Materials).

O-rings originally conforming to military specifications and which had reached the maximum allowed storage age of 4 years, were tested after an additional 5 years of shelf aging. During the original 4 years the rings were sealed in lined envelopes, but during the ensuing 5 years, some rings were exposed to light and air, some were exposed to air with light excluded and some were kept sealed in the original envelopes. No significant changes in physical properties from the standpoint of serviceability were observed after shelf aging for 5 additional years under the above conditions. It is concluded that O rings which meet the specification requirements will give satisfactory service after at least 9 years shelf aging at moderate room temperatures. (Author)

AD-430 770 Div. 14, 1
OTS price $1.10

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
EFFECT OF MIL-C-6799, TYPE II, SPRAYABLE, STRIPPABLE, PROTECTIVE COATING ON THE ADHESION OF MIL-C-22750A(WEP) EPOXY FINISH SYSTEM.
24 Feb 64, 3p.
Proj. PAN C12RMA52 45
NAEC AML1871 Unclassified report

Report on Development of Epoxy Coating System.

Descriptors: (*Aircraft finishes, Polyamide plastics), (*Polyamide plastics, Adhesion), Effectiveness, Performance (Engineering), Epoxy plastics.

AD-430 807 Div. 14, 25, 30
OTS price $1.60

Frick Chemical Lab., Princeton U., N. J.
MASTER CURVE OF POLYSTYRENE BY BALL INDENTATION TECHNIQUE,
by R. B. Taylor and A. V. Tobolsky. Feb 64, 14p.
Rept. no. TR RLT69
Contract Nonr185807, Proj. NR356 377
Unclassified report

Descriptors: (*Styrene plastics, Relaxation time), (*Relaxation time, Styrene plastics), Test equipment, Test methods, Viscoelasticity, Penetration, Shear stresses, Creep.

By measuring the shear compliance of polystyrene by a ball indentation method as a function of time at several temperatures, master curves in shear compliance and relaxation were constructed at 100 C. The master curve in relaxation was compared with that obtained by other workers using a combination of torsional creep and relaxation. (Author)

AD-430 809 Div. 14, 1
OTS price $1.10

Naval Air Engineering Center, Philadelphia, Pa.
RAIN REPELLENTS, DEVELOPMENT OF.
20 Feb 64, 2p.
NAEC AML188 Unclassified report

Report on Investigation of In-Flight Application of Formula 394 Rain Repellent.

Descriptors: (*Moistureproofing, Windshields), (*Windshields, Moistureproofing), Films, Halogenated hydrocarbons, Airplanes.

A series of dilutions of the #394 fluid with Freon TF was prepared. A mixture of 5% #394 was found to produce the most satisfactory results. The 5% mixture spread rapidly over a wide area and did not build up at the fringe area. It could be applied to a dry windshield or to a wet one on which rain was no longer hitting. (Author)

AD-430 837 Div. 14, 1
OTS price $5.60

Kaysam Corp. of America, Paterson, N. J.
STUDY OF PHYSICAL AND CHEMICAL CHARACTERISTICS OF BALLOONS AND BALLOON MATERIALS.
Quarterly progress rept. no. 3, 1 Sep-30 Nov 63,
by Eric Nelson, ed. by John Kantor. 30 Nov 63, 54p.
Contract DA36 039AMC02160E, Proj. 1A025001A126 04 04
Unclassified report

Descriptors: (*Meteorological balloons, Mechanical properties), (*Films, Meteorological balloons), (*Synthetic rubber, Meteorological balloons), Expanded plastics, Plasticizers, Additives, Antioxidants, Ozone, Infrared radiation, Ultraviolet radiation, Oxygen, High altitude, Storage, Tensile properties, Radiation damage.

The possibility of reaching an altitude of 100,000 ft. with a 750-g balloon made from compound A5-105 and flown with a lower free lift was investigated with only moderate success. A group of flights was performed with a view to increasing the rate of ascent of 100,000-ft balloons. Fifteen balloons designed for flight in the tropical zone were flown in the Canal Zone with excellent results, 83% reaching altitudes in excess of 100,000 ft. Two compounds were designed for high ozone resistance and low IR absorption. Laboratory tests indicated that these objectives were achieved, and 1000-g balloons made from one of these compounds performed satisfactorily and extremely consistently. Twelve balloons ranging in wt. from 1500 to 2500 g manufactured from compound A5-101 displayed excellent altitude performance and good consistency. The 2500-g balloons average almost 140,000 ft. (Author)

AD-430 861 Div. 14
OTS price $3.60

Olin Mathieson Chemical Corp., New Haven, Conn.
DEVELOPMENT OF NONFLAMMABLE HYDRAULIC FLUIDS AND LUBRICANTS.
Bimonthly progress rept. no. 2, 18 Dec 63-17 Feb 64,
by E. H. Kober, H. F. Lederle and G. F. Ottmann. 27 Feb 64, 35p.
Contract NObs90092
Unclassified report

Descriptors: (*Lubricants, Synthesis (Chemistry)), (*Hydraulic fluids, Synthesis (Chemistry)), Polymers, Phosphonitrile chlorides, Fluorine compounds, Spectra (Infrared), Stability, Heat, Physical properties, Refractive index, Viscosity, Flammability.

Additional trimeric and tetrameric mixed substituted (aryl-1-di H-polyfluoroalkyl) phosphonitrilates were prepared and evaluated. These products have generally lower viscosities and densities than the corresponding aryl-1, 1, omega-tri H-polyfluoroalkyl phosphonitrilates. Spontaneous ignition temperatures are high and the thermal stabilities of the trimeric and, especially, of the tetrameric products are considerably better than in the aryl-tri H-polyfluoroalkyl series. The best over-all properties were observed for tetrameric products substituted by trifluoroethoxy and m-chloro- or m-fluorophenoxy groups. Experiments aimed at preparing water soluble phosphonitrilates and experiments designed to link two phosphonitrile rings by means of diphenolethers or fluorinated glycols have been initiated. (Author)

AD-430 879 Div. 14, 27
OTS price $5.60

Naval Research Lab., Washington, D. C.
THERMAL SHOCK EVALUATION OF REFRACTORY MATERIALS AS ROCKET NOZZLE INSERTS,
by E. W. Kammer, H. Smith and Eugene Olcott.
30 Nov 63, 55p.
Task 71402; 71408
NRL 6005 Unclassified report

Descriptors: (*Nozzle inserts, Refractory materials), (*Refractory materials, Thermal stresses), Sintering, Tungsten, Impregnation, Tungsten alloys, Fracture (Mechanics), Silver alloys, Toughness, Strain gages, Heat, Resistance (Electrical), Thermal conductivity.

Uninfiltrated sintered tungsten of several densities together with copper or silver infiltrated material used as rocket nozzle inserts were examined using a small scale nozzle but with operational temperature, pressure, and time duration of exposure. The nozzle insert walls were notched in a manner to produce stress raisers and their effects on the fracture patterns established relative ratings for resistance to thermal shock. Room temperature fracture toughness factors were also determined from notched bars of these same materials. This toughness factor served as a quality rating score to order the materials in their ability to resist fracture. It was found that copper infiltrated sintered tungsten rated highest on both the model test and on the fracture toughness scale. Mechanical strain induced in the outer surface of the nozzle insert by temperature gradients across the wall at the beginning of the ignition sequence together with the temperature were measured with the aid of several types of electrical resistance gages. These gages verified that cracking of the nozzle insert wall occurred early in the burning process. (Author)

AD-430 910 Div. 14
OTS price $.75

Naval Civil Engineering Lab., Port Hueneme, Calif.
ACCELERATED TESTING OF PAINTS,
by Peter J. Hearst. 23 Dec 63, 24p.
Proj. Y F015 06 06 902
NCEL TN549 Unclassified report

Descriptors: (*Paints, Performance (Engineering)), (*Performance (Engineering), Bibliographies), (*Degradation, Paints), Humidity, Salt spray tests, Corrosion, Capacitance, Resistance (Electrical).

Results of a literature search of accelerated methods of testing paints are presented and discussed. Emphasis is placed on coatings applied to steel surfaces. No accelerated test methods are available for predicting reliably the service performance of paints. Some methods have limited usefulness in indicating probable performance. (Author)

AD-431 002 Div. 14, 26
OTS price $6.00

California U., Berkeley.
CRITICAL COMPILATION OF CERAMIC FORMING METHODS.
Rept. for Apr-Sep 63,
by A. G. Pincus, C. E. Butler and S. W. Bradstreet. Jan 64, 422p.
Contract AF33 657 10574, Proj. 7381, Task 738105
RTD TDR63 4069 Unclassified report

Report on Materials Application.

Descriptors: (*Ceramic materials, Material forming), (*Material forming, Ceramic materials), (*Bibliographies, Material forming), Particles, Powders, Vapors, Liquids, Solids, Pressure, Drawing (Machine processing), Casting, Impregnation, Sintering, Heat treatment, Melting, Explosive forming, Electrophoresis, Flame spraying, Films, Fibers, Physical properties, Chemical properties, Electrical properties, Magnetic properties, Extrusion, Machining, Ceramic fibers, Ceramic coatings, Documentation, Glass, Sheets.

A first phase study is presented on methods for forming and characterizing ceramics. Five reviews by individual authors appraise the state-of-the-art in characterizing the raw materials and batches and forming by cold, hot, melt, and miscellaneous processes. The derived fundamentals contributing to control over forming are briefly summarized. Initial bibliographies arranged on a specially evolved classification scheme introduce the literature on characterization of particles and assemblies of particles, and on forming of ceramics. (Author)

AD-431 051 Div. 14
OTS price $3.50

National Carbon Co., Lawrenceburg, Tenn.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS VOLUME XLII.
Summary technical rept., 1 May 60-30 Apr 63.
Jan 64, 218p.
Contract AF33 616 6915, Proj. 7350, 7381;
Task 735002, 738102
WADD TR61 72, vol. 42 Unclassified report

Report on Refractory Inorganic Non-Metallic Materials.

Descriptors: (*Graphite, Scientific research) (*Pyrolytic graphite, Scientific research), Manufacturing methods, Refractory materials, Carbon, Impurities, Additives, Crystal lattices, Crystal lattice defects, Crystals, Mechanical properties, Tensile properties, Emissivity, Thermal conductivity, Magnetic properties, Fibers (Synthetic), Composite materials, High temperature research, Foams, Cements, Rocket motors.

This report gives a summary of a research and development program on graphite and graphite-base materials over the period May 1, 1960 to April 30, 1963. The efforts covered raw materials studies, basic investigations of the elemental graphite crystals, fabrication studies including scaleup to useful sizes, and characterization and evaluation for applicability to selected weapons systems. (Author)

AD-431 149 Div. 14, 16, 32
OTS price $3.00

General Electric Co., Philadelphia, Pa.
INVESTIGATION OF TOXIC PROPERTIES OF MATERIALS USED IN SPACE VEHICLES.
Rept. for Mar 62 Jan 63,
by W. J. Olewinski, G. Rapier, T. K. Slawecki and H. Warner. 1963, 162p. Rept. no. 63SD795
Contract AF33 657 8029, Proj. 6302, Task 630203
AMRL TDR63 99 Unclassified report

Descriptors: (*Materials, Toxicity), (*Polymers, Bibliography), (*Bibliography, Materials), Organic materials, Spacecraft cabins, Spacecraft, Detection, Contamination, Gases, Vapors, Gas detectors, Particles, Test methods, Instrumentation, Identification, Thermal stresses, Stresses, Monitors, Biology, Polymers, Degradation, Temperature, Spectrophotometers, Gas analysis, Pyrolysis.

The objectives of this program were: (1) to compile lists of materials presently used or proposed for use in spacecraft - specifically, the Apollo, Mercury, Gemini, and Dyna-Soar programs - and to and to assess the possible toxic properties and breakdown products of these materials under thermal and other anticipated stresses and (2) to evaluate methods for the detection and identification of space cabin contaminants for the purpose of compiling the requirements, methods, and specifications on available instrumentation. These in turn can serve as the basis for development of a compact kit for detection of toxic off gassing from materials employed in space vehicles. For other than short duration missions, monitoring in strumentation must be capable of the detection and identification of a wide variety of toxic contaminants, some of which may not have been anticipated. A highly sensitive multiple gas detector, either directly or in combination with a trace gas separation and concentration technique, appears to be a desirable approach. (Author)

15. MATHEMATICS

AD-429 365 Div. 15
OTS price $3.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
CONSTANTS FOR THE GAUSSIAN QUADRATURE FORMULA FOR VALUES OF N FROM TWO TO THRITY,
by Paul Milnarich, Jr. and James P. Robinson. Dec 63, 26p.
Proj. 1A2 50206D241
AERDA 89 Unclassified report

Descriptors: (*Numerical analysis, Integration), Polynomials, Series, Functions, Weight, Errors.

The 2N constants for the Nth order Gaussian quadrature formula for N equal to any integer from two to thirty are presented to an accuracy of twenty-eight significant digits. The methods used for computing the constants and estimates of their probable error are discussed. The Gaussian quadrature formula is derived in detail in Appendix A. The derivation has been guided by tutorial considerations rather than mathematical rigor. (Author)

AD-429 389 Div. 15
OTS price $8.60

Naval Postgraduate School, Monterey, Calif.
MITROVIC'S METHOD - SOME FUNDAMENTAL TECHNIQUES,
by George J. Thaler and Toyomi Ohta. Jan 64, 1v.
NPS RP42 Unclassified report

Descriptors: (*Polynomials, Simultaneous equations), Conformal mapping, Determinants, Functions, Stability, Programming (Computers), Curve fitting.

AD-429 398 Div. 15
OTS price $3.60

Michigan U. Coll. of Literature Science and the Arts, Ann Arbor.
NOTES ON MATHEMATICAL AUTOMATA THEORY,
by J. W. Thatcher. Dec 63, 33p. Rept. no. 03105 26T
Contract Nonr1224 21; DA31 124AROD G433
ORA Projs. 03105; 05662
Unclassified report

Descriptors: (*Algebras, Theory), (*Automation, Mathematical analysis), Operators (Mathematics), Conformal mapping.

The purpose of these notes is to present some of the basic concepts and results of finite automata theory within this framework. (Author)

AD-429 399 Div. 15
OTS price $1.60

Michigan Univ., Ann Arbor Coll. of Literature, Science and the Arts.
THE THEORY OF ALGEBRAIC AUTOMATA I. MORPHISMS AND REGULAR SYSTEMS,
by Yehoshafat Give'on. Jan 64, 17p. Rept. no. 03105 27T
Contract Nonr122421, DA31 124AROD G433,
ORA Projs. 03105, 05662
Unclassified report

Descriptors: (*Computer logic, Theory), Groups (Mathematics), Numerical analysis, Algebras.

This study is directed to homomorphisms of monoids and their effect on subsets of monoids. General algebraic framework is suggested in which several and various domains in the area of automata theory (like finite-state transductions, commutative machines, and context-free languages) can be studied and generalized uniformly. The study of the basic and immediate properties of regular systems in monoids and the effect of homomorphisms on such systems is presented. (Author)

AD-429 515 Div. 15
OTS price $4.60

Numerical Analysis Research U. of Calif., Los Angeles.
MULTIPLIERS OF P-INTEGRABLE FUNCTIONS,
by Alessandro Figa-Talamanca. Jan 64, 40p.
Unclassified report

Doctoral thesis.

Descriptors: (*Algebras, Groups (Math)), Operators (Mathematics), Special function, Integral equations, Functional analysis, Algebraic topology, Integral transforms, Harmonic analysis, Partial differential equations, Fourier analysis.

Given a locally compact Abelian group and the space integrable functions on said group; with the space of multipliers on the functions defined as the space of bounded operators on the functions which commute with translations by elements of the group; it is proved that the space of multipliers is the conjugate space of a Banach space of continuous functions on the group. As a direct consequence, it is shown that the space of multipliers is the closure in the weak (strong) operator topology of the span of the translation operators. The results are applied to the study of translates of multipliers and to the relations between multipliers and lacunary sets of the character group of the compact group. (Author)

AD-429 720 Div. 15, 32
OTS price $2.60

RAND Corp., Santa Monica, Calif.
VALUES OF LARGE MARKET GAMES. STATUS OF THE PROBLEM,
by Lloyd S. Shapley. Feb 64, 18p. Memo. no. RM3957PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Economics, Game theory), Mathematical models, Mathematical logic.

Several models of exchange economies with many participants are discussed, in which the game-theoretic value either coincides with, or converges to, the classical Walrasian solution based on price equilibrium. A connection is thereby indicated between fair division (in a collusive world) and free competition (in a non-collusive world). The discussion is informal, but technical. The relevant mathematical models, both game-theoretic and economic, are detailed in two Appendices. (Author)

AD-429 725 Div. 15, 25
OTS price $4.60

Emmanuel Coll., Research Language Center, Boston, Mass.
THE THEORY OF PLANIGONS (Teoriia Planigonov),

by B. N. Delaunay, tr. by Richard M. Holden.
July 63, 39p. RT ETR63 9
Contract AF19 604 8505
Unclassified report

Trans. from Akademiia Nauk SSSR, Izvestiia, Seria Matematicheskaia, Vol. 23, pp. 365-386, 1959.

Descriptors: (*Crystal structure, Theory), Crystal lattices, Surfaces, Groups (Mathematics), Topology, Spheres.

Subdivisions of a plane into fundamental regions for two-dimensional Fedorov groups are studied, and all possible contiguity symbols are determined which set those motions by means of which a given fundamental region passes over into regions contiguous to it. The work shows that the entire problem is combinatorially topological, and thus a new purely topological conclusion for two-dimensional Fedorov groups is obtained. The following theorem is proved: There are only 11 (eleven) topologically different regular grids which satisfy the basic lemma of integral calculus. (Author)

AD-429 755 Div. 15
OTS price $3.60

Washington U., Seattle, Coll. of Engineering.
PERIODIC STRUCTURES ON CURVED SURFACES,
by Eric Gung-Hwa Lean and Akira Ishimaru. Oct 63, 27p. Technical rept. no. 84
Contract AF19 628 2763, Proj. 5635, Task 563502
AFCRL 63 566 Unclassified report

Descriptors: (*Curved profiles, Periodic variations), Cylindrical bodies, Hemispherical shells, Mechanical waves, Propagation, Perturbation theory, Harmonic analysis.

An extension is presented of the theory developed for plane periodic structures to cylindrical structures having an azimuthal periodicity. The main object is obtaining k - v diagrams (where v is the complex azimuthal propagation constant). Since the cylindrical structures considered have azimuthal periodicity, the fields can be expanded, in accordance with Floquet's theorem, in space harmonics. Two particular structures are considered: (a) the curved corrugated surface and (b) the curved periodic slotted conductors. For (a) the characteristic equation for v is obtained by equating appropriate energies on the surface of the structure; for (b), the characteristic equation is obtained by using the transverse resonance condition. An approximate solution for v is found for structure (a). In this case, a perturbation technique permits obtaining the real and imaginary part of the azimuthal propagation constant for the slow region and for the n equals minus 1 leaky wave region. (Author)

AD-429 846 Div. 15, 16
OTS price $1.60

New York State Coll. of Agriculture, Cornell U., Ithaca.
A RANK-SUM TEST OF WHETHER TWO MULTIVARIATE SAMPLES WERE DRAWN FROM THE SAME POPULATION. Preliminary rept.,
by D. S. Robson. Feb 64, 9p. Rept. no. TR14
Contract Nonr40139, Proj. NR042 212
Unclassified report

Descriptors: (*Medical research, Mathematical analysis), (*Statistical tests, Medical research), Algebras, Statistical analysis.

The problem considered was first posed as the question of whether birds of a feather nest together. The statistical problem is that of devising a test of the hypothesis that the two species were randomly mixed over the occupied cliff ledges. A configuration of N=m+n points (in a metric space) which have been partitioned into two sets, A and B, of m and n points, respectively, is given and a procedure is required for testing the hypothesis of random partitioning against the alternative hypothesis that A and B are the result of some form of segregating operation. Such a nonparametric test procedure, being based only on the conditional distribution of partitions for the given configuration of m+n points, should have application to the general problem of testing whether two multivariate samples were drawn from the same population. (Author)

AD-429 853 Div. 15, 13, 1, 31
OTS price $5.60

Polytechnic Inst. of Brooklyn, N. Y.
DEEP OVAL RING EQUATIONS WITH SIMPLIFICATIONS FOR APPLICATION TO RING-SHELL COMBINATIONS,
by William P. Vafakos. Feb 64, 60p.
PIBAL rept. no. 678
Contract Nonr839 14, Proj. NR064 167
Unclassified report

Descriptors: (*Equations, Rings), (*Stiffened cylinders, Pressure), Monocoques, Ellipsoids, Loading (Mechanics), Integrals, Structural shells, Topology, Stresses, Cylindrical bodies, Curved profiles, Displacement reactions, Differential equations, Geometric forms.

Equations which are applicable to deep oval rings in which the local curvature of an arbitrary reference line is prescribed are derived and simplified for application to oval ring-shell combinations. Theoretical estimates of the stresses and displacements are obtained for a typical reinforcing ring of a ring-stiffened oval cylinder recently tested under hydrostatic pressure by the David Taylor Model Basin. These results are obtained by appropriately approximating the oval cross-section and by assuming that the composite structure responds as an oval ring. The theoretical flange stresses are shown to be in good agreement with available test results. (Author)

AD-429 868 Div. 15
OTS price $2.60

Digital Computer Lab., U. of Illinois, Urbana.
THREE NEW MERSENNE PRIMES, AND A CONJECTURE,
by Donald B. Gillies. 27 May 63,-rev. 22 June 64, 29p. Rept. no. 138
Unclassified report

Descriptors: (*Number theory, Programming (Computers)), Statistical distributions, Computers.

The Mersenne primes, 9689, 9941, and 11213, are discussed and the following conjecture is formulated: If A is less than or equal to B is less than or equal to the square root of Mp (where A and B are integers and Mp is a Mersenne prime), then the probability that there is no divisor s of Mp in the interval (A,B), is given asymptotically by logA/Log B if A is greater than or equal to 2p. or by log2p/logB if A is less than 2p; and prime divisors are statistically independent. Thus Mersenne numbers are asserted to have the same likelihood of being prime, and to

have the same statistical distribution of factors as integers of about the same size which are selected to have no factors less that 2p but are otherwise randomly chosen. (Author)

AD-429 907 Div. 15
OTS price $1.60

Brown U., Providence, R. I.
PRODUCTS OF INDEPENDENT IDENTICALLY DISTRIBUTED STOCHASTIC MATRICES,
by M. Rosenblatt. Jan 64, 15p. TR10
Contract Nonr562 29, Proj. NR042 217
Unclassified report

Descriptors: (*Topology, Groups (Mathematics)), (*Probability, Statistical processes), Statistical distributions, Matrix algebra, Statistical distribution, Probability, Operators (Mathematics), Stochastic processes.

Generalized results from the study on the probability distribution on a compact group are interpreted and examples are cited.

AD-429 958 Div. 15, 1
OTS price $2.60

Aeronutronic, Newport Beach, Calif.
COMPARATIVE STUDY OF RUNGE-KUTTA AND LANCZOS NUMERICAL INTEGRATION METHODS,
by Milton S. Allione. 9 Jan 64, 24p. Rept. no. U2421
Contract AF19 628 562
ESD TDR63 662 Unclassified report

Descriptors: (*Numerical methods and procedures, Errors), (*Aircraft, Drag), Perturbations, Differential equations, Operators (Mathematics), Astrophysics, Taylor series, Lutegration, Optimization.

This document presents a comparative study of the Runge-Kutta and Lanczos numerical integration methods for solving the system of ordinary differential equations associated with the Variation of Parameters formulation. Results of ephemeris computations using each method are compared with a standard to determine relative position error growth. Conclusions are drawn regarding relative merits of the two methods. (Author)

AD-429 969 Div. 15
OTS price $1.60

RAND Corp., Santa Monica, Calif.
MATERIAL MOMENTUM-ENERGY TENSORS AND THE CALCULUS OF VARIATIONS,
by Dominic G. B. Edelen. Feb 64, 13p. Rept. no. RM3993PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Calculus of variations, Tensor analysis), (*Fluid dynamic properties, Geodesics), Relativity theory, Field theory, Fluids, Mechanics, Gravity.

It is shown that if the Einstein field equations of general relativity are derived from a homogeneous variational principle, then the dynamical processes of the space are intrinsically reversible. As an application, it is shown that an isolated world tube of perfect fluid contains a geodesic stream line, provided the field equations are derived from a variational principle. (Author)

AD-430 200 Div. 15
OTS price $1.60

RAND Corp., Santa Monica, Calif.
THREE-POINT HYPERBOLIC EXTRAPOLATION TO SOLVE EQUATIONS,
by M. L. Juncosa. Feb 64, 17p. Rept. no. RM3975PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Equations, Numerical analysis), Determinants, Programming (Computers).

Three-point parabolic extrapolation to iteratively solve real or complex, algebraic or transcendental equations has been proposed by D. E. Muller and used frequently on automatic computers, particularly in determination of eigenvalues of matrices. It is suggested that three-point equilateral hyperbolic extrapolation enjoys the same reasons for adoptions as parabolic extrapolation, but has the added advantages that one avoids at each iteration a square root determination, a sign determination, and necessity of guarding against the possibility of being thrust into the complex domain when seeking real roots of real equations. It is also shown that the order of convergence is the same as that of parabolic extrapolation. (Author)

AD-430 253 Div. 15
OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
REMARKS ON A MIXED BOUNDARY VALUE PROBLEM FOR LINEAR HYPERBOLIC PARTIAL DIFFERENTIAL EQUATIONS IN TWO INDEPENDENT VARIABLES,
by Sherwood C. Chu and J. B. Diaz. 30 Dec 63, 23p.
NOL TR63 278 Unclassified report

Descriptors: (*Boundary value problem, rartial differential equations), Nonlinear differential equations, Inequalities, Numerical analysis, Functional analysis.

AD-430 437 Div. 15
OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
MINIMAL INTERCHANGES OF (0,1)-MATRICES AND DISJOINT CIRCUITS IN A GRAPH,
by David W. Walkup. Sep 63, 13p. Mathematical note 323; Document no. D1 82 0305
Unclassified report

Also available from the author.

Descriptors: (*Matrix algebra, Combinatorial analysis), Networks.

It is shown that the minimal number of interchanges necessary to transform one (0,1)-matrix into another equivalent one may be computed from the maximal number of edge-disjoint circuits in a bipartite graph derived from the difference of the matrices. This partially answers a question raised by Ryser. Two (0,1)-matrices are said to be equivalent if their difference has zero row and column sums. They are said to differ by an interchange if they are equivalent and their difference is zero except for a 2x2 minor. (Author)

AD-430 445 Div. 15
OTS price $1.10

Stanford U., School of Humanities and Sciences, Calif.
THE THEOREMS IN A PAPER BY V. K. SAULEV ON AN

ESTIMATE OF THE ERROR IN OBTAINING CHARACTERISTIC FUNCTIONS BY THE METHOD OF FINITE DIFFERENCES,
by G. E. Forsythe. 20 Jan 64, 8p. Technical rept. no. 34
Contract Nonr22537, Proj. NR044 211
Unclassified report

Descriptors: (*Matrix algebra, Errors), Numerical analysis, Difference equations, Functions, Inequalities, Partial differential equations.

AD-430 564 Div. 15, 30
OTS price $3.60

New York State U., Stony Brook.
A TIME DOMAIN CHARACTERIZATION OF RATIONAL POSITIVE-REAL MATRICES.
Scientific rept. no. 1,
by A. H. Zemanian. 5 Aug 63, 33p. Rept. no. 12
Contract AF19 628 2981, Proj. 5628, Task 562801
AFCRL 63 390 Unclassified report

Descriptors: (*Networks, Matrix calculus), Transients, Integral transforms, Circuits, Functions, Distribution theory, Complex variables, Linear systems, Time.

Let w(t) denote the distributional inverse Laplace transform of a rational function W(s), where the corresponding region of convergence is taken to be a half-plane extending infinitely to the right. In addition it is assumed that w(t) is an ordinary function that satisfies certain conditions on its integrability, then it is shown that a necessary and sufficient condition for W(s) to be positive-real is that the even part of w(t) be a nonnegative-definite function. Necessary and sufficient conditions are established, which characterize the universe Laplace transform of W(s) in terms of nonnegative-definite distribution and their orders. A similar result for positive-real matrices is given. The two theorems give a complete time-domain characterization of lumped linear fixed finite and passive n-ports. (Author)

AD-430 565 Div. 15, 30
OTS price $1.60

New York State U., Stony Brook.
A TIME DOMAIN CHARACTERIZATION OF POSITIVE-REAL MATRICES,
by A. H. Zemaniam. 16 Aug 63, 7p. Scientific rept. no. 2
Contract AF19 628 2981, Proj. 5628, Task 562801
AFCRL 63 391 Unclassified report

Descriptors: (*Networks, Matrix algebra), (*Linear systems, Distribution theory), Integral transforms, Functions, Time.

Necessary and sufficient conditions for a matrix W(s) to be positive-real are established, which characterize the universe Laplace transform of W(s) in terms of nonnegative-definite distribution and their orders. (Author)

AD-430 593 Div. 15, 30
OTS price $11.50

Washington U., Seattle.
FACTOR ANALYSIS OF DATA MATRICES. PART III,
by Paul Horst. Jan 64, 153p.
Contract Nonr47733
Unclassified report

Descriptors: (*Factor analysis, Data), (*Matrix algebra, Data), (*Statistical analysis, Correlation techniques), (*Factor analysis, Reviews), (*Data processing systems, Reviews), Analytic geometry, Groups (Mathematics), Programming (Computers), Complex variables.

This is Part III of a series of reports on rationales and techniques of matrix factoring which play an important role in multivariate analysis techniques. The methods discussed are basic structure solutions. They include: Jacobi type, order reduction, solutions from incomplete covariance matrices, factoring data matrices. The most important characteristic of these methods is that the solution involves repeated operations with a one-parameter square orthonormal matrix, as distinguished from repeated matrix by vector multiplication. The solutions are interactive or consist of a series of successive approximations. They are not self-correcting for the successive approximations. This means that each cycle of computations accumulates decimal error and passes it on to the next cycle. Two variations of the method which involves repeated operations with a single parameter square orthonormal matrix are discussed. The simultaneous method is an iterative solution involving one-parameter orthonormal transformations, or what is sometimes known as binary rotations; the successive method is that which involves the same type of orthonormal transformations of the original matrix, but the basic diagonals and corresponding orthonormal vectors are solved for in order of magnitude.

AD-430 676 Div. 15
OTS price $1.10

California U., Berkeley.
(No title).
Final rept. 1 Oct 59-30 Sep 61,
by M. Rosenlicht. 30 Sep 61, 3p.
Contract AF49 638 603
AFOSR 2873 Unclassified report

Descriptors: (*Algebraic geometry, Rings), (*Algebra, Groups (Mathematics), Research program administration.

A brief resume is given of the work done on algebraic geometry. Descriptions are given of some resulting reports: Algebraic rings, toroidal algebraic groups, quotient varieties and the affine embedding of certain homogeneous spaces, and questions of rationality for solvable algegraic groups over nonperfect fields.

AD-430 681 Div. 15, 25
OTS price $10.50

Courant Inst. of Mathematical Sciences, New York U., N. Y.
ASYMPTOTIC METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS: THE REDUCED WAVE EQUATION AND MAXWELL'S EQUATION,
by Robert M. Lewis and Joseph B. Keller. Jan 64, 132p. Research rept. no. EM194
Contract AF19 604 5238, Proj 5635, Task 563502
AFCRL 63 551 Unclassified report

Descriptors: (*Partial differential equations, Mechanical waves), (*Mechanical waves, Reviews), Reflection, Diffraction, Boundary value problems, Wave transmission.

The asymptotic theory of the reduced wave equation and Maxwell's equations for high frequencies is presented. The theory is applied to representative problems involving reflection, transmission, and diffraction in homogeneous and inhomogeneous media. The report contains few new results. It is intended to unify and summarize the existing literature on the subject. (Author)

AD-430 756 Div. 15
OTS price $8.60

Kansas U., Lawrence.
INTERPOLATION SPACES AND INTERPOLATION METHODS,
by N. Aronszajn and E. Gagliardo. Jan 64, 92p.
Rept. no. TR3
Contract Nonr583 13, Grant GP439
Unclassified report

Descriptors: (*Algebraic topology, Reviews), (*Metamathematics, Functional analysis), Mathematical logic.

A study is made of the general structure of all possible interpolation methods. For some applications intermediate spaces between two given Banach spaces for which such a general interpolation method exists are characterized. The relevant intermediate spaces are those which are called interpolation spaces between two given Banach spaces. The aim is to get rid of the redundant topoligical vector space in which the Banach spaces are usually supposed to be continuously imbedded. Further, normalized Banach subspaces of a given Banach space are introduced. The main theorem is that the lattice of these subspaces is complete and we give the construction of the joint and meet for an arbitrary class of such subspaces. The main results concerning interpolation methods and interpolation theorems are analyzed. (Author)

AD-430 761 Div. 15
OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
A CONDITION NECESSARY AND SUFFICIENT FOR A FUNCTION TO BE EQUAL TO ITS CONTINUED FRACTION EXPANSION. APPENDIX: THE EFFECT OF REMAINDERS ON CONVERGENCE,
by Ralph E. Lane and T. L. Hayden. Nov 63, 28p.
Technical summary rept. no. 423
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Functions, Continued fractions), Numerical analysis, Errors, Series.

The problem of whether or not a continued fraction expansion for a specified function is equal to that function is solved in terms of the remainders of the expansion. A method of expanding a continued fraction is given, which has application to many other functions, and the results of the previous sections are applied to show that the expansion is equal to the given function. A method of obtaining approximations of specified accuracy is also given. In the appendix various expansions are obtained for the remainders of the example considered and the effect of these remainders on the rate of convergence is considered. (Author)

AD-430 762 Div. 15, 25
OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
NOTES ON THE SCHROEDINGER OPERATOR,
by Robert Ryan. Jan 63, 22p. Rept. no. TS441
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Continuous spectrum, Analysis), (*Mechanical waves, Fluid dynamic properties), Fluid mechanics, Potential theory, Integral equations, Partial differential equations, Operators (Mathematics), Scattering, Perturbation theory, Quantum mechanics, Motion.

This paper is concerned with properties of the spectrum and resolvent of Schroedinger operators in 3-dimensional Euclidean space. A discussion is included of the negative spectrum under several assumptions. (Author)

AD-430 763 Div. 15
OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
A CHARACTERIZATION OF NUMBERTHEORETIC PREDICATES,
by Bruno Scarpellini. Nov 63, 22p. Rept. no. TSR439
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Number theory, Mathematical logic), Functions, Algebras, Metamathematics.

AD-430 764 Div. 15
OTS price $4.60

Mathematics Research Center, U. of Wisconsin, Madison.
RELATIONS BETWEEN PERIODS AND AMPLITUDES OF PERIODIC SOLUTIONS OF x + g(x).EQUAL 0,
by Minoru Urabe. Nov 63, 50p. TSR437
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Motion, Numerical analysis), Fluid dynamic properties, Oscillation, Vibration, Functions, Differential equations, Reviews, Abstracts.

The period of the periodic motion described by the equation in the title varies with its amplitude or amplitude of velocity. The problem studied in the present report is to find the relations between the period and the amplitude or the amplitude of velocity in such a form that, from these relations, it is possible to determine the function g(x) which yields periodic motions whose period may vary in the arbitrary perscribed way with the amplitude or the amplitude of velocity. The half-periods and the half-amplitudes are also brought into question. In illustration, there is computed the function g(x) which yields periodic motions whose period may vary linearly with the amplitude. (Author)

AD-430 765 Div. 15
OTS price $4.60

Mathematics Research Center, U. of Wisconsin, Madison.
POSTULATES FOR A NORMED BOOLEAN ALGEBRA,

by Alfred Lehman. Apr 63, 49p. Rept. no. TSR389
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Algebras, Mathematical analysis), Mathematical logic, Theory, Probability, Metamathematics, Statistical tests, Game theory.

AD-430 768 Div. 15
OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
ON MEROMORPHIC TYPICALLY-REAL FUNCTIONS,
by E. P. Merkes. Oct 63, 17p. Rept. no. TSR425
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Special functions, Reviews), Networks, Algebras, Algebraic topology, Moments, Continued fractions, Conformal mapping, Real variables, Sequences, Transformation (Mathematics), Functions.

Let TM denote the class of funtions f(z) which are typically-real and meromorphic in the complex plane with slits on the real axis, analytic at z = 0, and normalized by f(0) = 0, f sub 1 (0) = 1. Characterizations of this class and a related class of functions are obtained as Stieltjes transforms and as bounded real J-fractions. From these representations, the exact regions of variability of functions in TM and of their first derivatives are derived. Finally, sharp regions of univalence of certain subclasses of TM are given. (Author)

AD-430 847 Div. 15
OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
REMAINDERS FOR CONTINUED FRACTIONS,
by T. L. Hayden. Nov 63, 12p. Rept. no. TSR429
Contract DA11 022ORD2059
Unclassified report

Descriptors: (*Continued fractions, Numerical analysis), Complex numbers, Sequences, Transformations (Mathematics), Inequalities.

A study is made of the problem of whether or not a function is equal to its formal continued fraction expansion. This question is answered in terms of the convergence of the continued fraction and the relation of the region which contain the remainders of the continued fraction and the region which contains the quantities Bn/Bn-1, where Bn is the denominator of the nth approximate to the continued fraction. The problem of uniform convergence of the continued fraction is avoided. (Author)

AD-430 925 Div. 15, 5
OTS price $3.60

Aerospace Corp., Patrick Air Force Base, Fla.
STATISTICAL STUDY TO ASCERTAIN THE VALIDITY OF THE AMR RADIO CIRCUIT PERFORMANCE SUMMARIES FOR HF RADIO OUTAGE,
by J. L. Bagg. 29 Feb 64, 32p. Rept. no. TOR 269 A4306 6
Contract AF04 695 269
Unclassified report

Descriptors: (*Statistical analysis, Radio equipment), (*Radio equipment, Statistical analysis), (*Failure (Mechanics), Radio equipment), Sampling, Launching, Frequency shift, Propagation, Attenuation, Statistical distributions, Time, Reliability (Electronics), Monitors, Tables.

Radio circuit performance summaries make it appear that outage due to frequency fade or propagation difficulties was not randomly distributed for an extended time period. It is contended that outage was more likely to be recorded during a period near launch time as circuit monitoring and traffic were heavy while the monitoring effort between launches was less effective. To support this contention, available data for the P13D, P13U, and P26D transmission links were examined. The data examined were the number of quarter-hour outages in various time intervals before and after the launch times and also before and after a set of pseudo-launch times. This included a study of 27 launches and 25 pseudo launches. The statistical analysis was based upon the following assumptions: (1) If monitoring is continuous the actual number of quarter-hour outages during time intervals used in this study should be near the expected value; (2) if monitoring is heavier during launches, then the recorded outages would exceed the expected value; (3) if monitoring is lighter between launches it would be significantly below the expected value. The statistical hypothesis tested was that the actual number of quarter-hour outages should not differ significantly from the predicted theoretical outage based on outage data collected for 8 months. (Author)

AD-430 995 Div. 15, 16
OTS price $7.60

Stanford U., Calif.
ON AGE DEPENDENT BRANCHING PROCESSES,
by Howard Weiner. 27 Jan 64, 79p. Rept. no. 94
Contract Nonr22552, Proj. NR342 022
Unclassified report

Descriptors: (*Statistical processes, Mitosis), (*Mitosis, Mathematical models), Statistical distribution, Stochastic processes, Difference equations, Differential equations, Probability, Integral transforms, Correlation techniques, Moments, Population, Growth, Mathematical analysis, Medical research.

This paper deals with asymptotic properties of various models of age-dependent branching processes. Cell growth is considered in which a cell proceeds in a sequential manner through n independent states, state R with its life distribution FR, R=1,2,...,n. At the end of mitosis, the nth state, the cell divides into similar cells, the number of which is goverened by a generating function h, independent of the time and other cells of the process. A variation of the given model treats cell growth in which the cell proceeds from state to state according to a general semi-Markov process until the mitotic state is completed, when division into similar cells in accord with h occurs. The random variable is considered in a simple age dependent branching process for m > 1. Another case is that of two types of cells, of which only one type may divide while the other either accumulates or is eventually absorbed in the medium. An example of this is the production of stem cells and red blood cells from parent stem cells. Two related models are considered, both examples of the 'reducible case'. Increasing cell populations are considered. A binary fission case of each model may be represented schematically to indicate the various combinations of cell births with corresponding probabilities. (Author)

AD-431 008 Div. 15, 25
OTS price $1.10

Queens Coll., Flushing, N. Y.
(No title).
by A. L. Harvey. Jan 64, 8p. Rept. no. TR2
Grant Nonr G00045 63
Unclassified report

Descriptors: (*Gravity, Theory), (*Transformations (Mathematics), Tensor analysis), Relativity theory, Geodesics, Particle trajectories, Topology, Continuum mechanics, Time.

AD-431 018 Div. 15
OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
NORMS AND CONDITION NUMBERS,
by Albert W. Marshall and Ingram Olkin. Feb 64, 12p. Document no. D1 82 0326; MN334
Unclassified report

Also available from the author.

Descriptors: (*Inequalities, Numbers), Matrix algebra, Functions, Number theory.

The condition number c phi of a non-singular matrix A is defined by c phi(A) = phi(A)phi(A(-1), where ordinary phi is a norm. It is known that for certain norms, the matrix AA* is more ''ill-conditioned'' than A, i.e., c phi(A) is lesser than c phi(AA*). We prove that this inequality holds whenever the norm phi is unitarily invariant (pni(A) is a function of the characteristic roots of AA*). However, we show that the inequality is independent of the usual norm axioms. Some more general inequalities are also obtained. (Author)

AD-431 062 Div. 15, 28
OTS price $2.60

Educational Testing Service, Princeton, N. J.
TRUE SCORE THEORY--THE FOUR-PARAMETER BETA MODEL WITH BINOMIAL ERRORS,
by Frederic M. Lord. Jan 64, 28p. Rept. no. RB64 6
Contract Nonr2752 00, Proj. NR151 201
Unclassified report

Descriptors: (*Statistical funtions, Special functions), (*Statistical tests, Mathematical prediction), (*Psychometrics, Mathematical models), Statistical distributions, Probability, Binomials, Statistical processes, Measurement, Functions, Errors.

A promising model for the relation between true score, Z, and observed score, x, asserts that the conditional distribution of observed score when true score is fixed is a binomial with parameters Z and n, where n is the number of items in the test; also that the distribution of Z in the group tested is a four-parameter beta distribution. It was found that this model successfully fitted most observed-score distributions, as judged by a chi-square test, except for those with more than 100,000 examinees. The model is also capable of predicting the frequencies in the scatterplot between two tests of the same trait, using only the information given by the two marginal frequency distributions. When such predictions were tried out for six different scatterplots, the fits seemed visually good. However, five of six chi-squares were significant at the 5 percent level. Examination of the discrepancies between observed scatterplots and predicted scatterplots showed a simple pattern. (Author)

AD-431 097 Div. 15
OTS price $2.60

Mathematics Research Center, U. of Wisconsin, Madison.
ON THE TOPOLOGICAL STRUCTURE OF SOME ORDERED FAMILIES OF DISTRIBUTIONS,
by J. Pfanzagl. Nov 63, 28p. Rept. no. TSR424
Contract DA11 0220RD2059
Unclassified report

Descriptors: (*Probability, Measure theory), (*Topology, Conformal mapping), Statistical distributions, Sequencies, Functions, Distribution theory.

The consequences are investigated of the order relation on the structure of the family distribution. Among other, it is shown that a nondegenerate family of distributions (i.e. a family containing at most a countable number of isolated degenerate distribution) is dominated, if it is ordered (2). An easy consequence is that the parameter space of a nondegenerate ordered (2) family is a subset of the real line. (Author)

AD-431 104 Div. 15
OTS price $1.10

Columbia U., New York.
MAPS WHICH INDUCE THE ZERO MAP ON HOMOTOPY,
by Donald W. Kahn. 1964, 8p. Rept. no. CU15
Contract NOnr26657
Unclassified report

Descriptors: (*Conformal mapping, Topology), Groups (Mathematics), Theory.

AD-431 113 Div. 15, 30
OTS price $3.60

Magnavox Co., Torrance, Calif.
STUDY OF CORRELATION PROPERTIES OF BINARY SEQUENCES.
Interim rept. no. 1, 15 Oct 63-15 Jan 64,
by Robert Gold. 13 Jan 64, 37p. Rept. no. R692
Contract AF33 615 1011
Unclassified report

Descriptors: (*Correlation techniques, Computers), (*Communication systems, Sequences (Mathematics)), (*Programming (Computers), Mathematical models), Linear systems, Errors, Communication theory, Polynomials, Mathematical analysis, Mathematical logic, Algebras, Conformal mapping, Matrix algebra.

Properties of the correlation properties of the linear sequences are discussed and a new and promising approach to the problem of correlation of linear sequences is developed. Families of linear sequences of equal period are generated from a single shift register. The class of sequences with bounded cross correlation is de-

AD-431 099 Div. 15
OTS price $1.60

Columbia U., New York.
THE RANK OF S2 X S1,
by Harold Rosenberg. 1963, 20p. Rept. no. CU1
Contract Nonr G00011 64M
Unclassified report

Descriptors: (*Topology, Conformal mapping), (*Groups (Mathematics), Theory), Cylindrical bodies, Surfaces.

termined as well as the bounds on the cross correlation function of certain maximal sequences and hence on the corresponding family of sequences. The appendix presents a discussion of elementary properties of binary sequences, elementary algebraic properties of sequences, and error correcting codes. (Author)

AD 431 196 Div. 15
OTS price $8.60

Sylvania Electric Products, Inc., Waltham, Mass
METHODS FOR PREDICTING SYSTEM PERFORMANCE.
Oct 63, 93p. Rept. no. F3050 1
Contract AF19 628 2918
ESD TDR63 627 Unclassified report

Descriptors: (*Mathematical prediction, Command & control systems), (*Command & control systems, Mathematical models), (*Communication systems, Mathematical models), Operations research, Linear programming, Performance (Engineering), Communication theory.

Queueing aspects of four Command and Control Systems and one large communications system are discussed. The applicability of state of the-art queueing theory techniques to analyses of Command and Control Systems is demonstrated, and the need for new research in tandem queues is discussed. Two research approaches to tandem queueing problems are reported. (Author)

16. MEDICAL SCIENCES

AD-429 377 Div. 16
OTS price $1.10

Missouri U., Kansas City School of Dentistry.
EVALUATION OF CLINICAL PROCEDURES IN DENTISTRY.
Annual progress rept. 1 July-31 Dec 63,
by Hamilton B. G. Robinson and Jack L. Stewart.
15 Jan 64, 7p.
Contract DA49 193md2430
Unclassified report

Descriptors: (*Dentistry, Processing), Effectiveness, Determination, Radiography.

In order to determine a more efficient means of processing and treating dental patients, this study has been carried out comparing conventional methods with newer techniques. Experience with panoramic radiographic methods indicates: a time savings of 87% to survey, fifteen per cent time savings to develop, patient and operator acceptance is favorable and film evaluation has not been attempted. Clinical examination methods are being modified by using dictating and transcribing equipment. A study employing ultrasonics for prophylaxis shows: a time savings of 17% for operator and patient, ultrasonics appears to remove deposits effectively and operator and patient acceptance is good. Radio frequency heating is being investigated as a means of heating and casting dental alloys. Plans are being formulated to investigate the possible advantages of expanding the duties and areas of responsibility of auxiliary personnel. The approval of the local dental society and the state board will be sought before definite steps are taken in this area of study. (Author)

AD-429 378 Div. 16
OTS price $1.60

Bionetics Research Laboratories, Inc., Falls Church, Va.
NEW METHODS DEVELOPMENT FOR IRRITANT SCREENING.
Quarterly progress rept. no. 3, 23 Sep-22 Dec 63,
by E. Ross Hart. 22 Dec 63, 10p.
Contract DA18 108AMC119A
Unclassified report

Descriptors: (*Histamine, Metabolism), Eye, Skin, Tissues (Biology), Laboratory animals, Chemical compounds, Pharmacology.

Peritoneal mast cells have been found to liberate too small a quantity of histamine to permit evaluation of the activity of irritants. Guinea pig lungs appear suitable. Mice and dogs appear inferior to rabbits for evaluation of eye irritation. Assessment by current methods has now been accomplished on a cumulative total of approximately 280 compounds. (Author)

AD-429 382 Div. 16
OTS price $1.60

Johns Hopkins U., School of Hygiene and Public Health, Baltimore, Md.
ISOLATION OF SPECIFIC ANTIGENS FROM LARVAL AND ADULT STAGES OF SCHISTOSOMES,
Annual rept., 1 May 63-30 Apr 64,
by Naim H. Kent. 30 Apr 64, 12p.
Contract DA49 193MD2276
Unclassified report

Descriptors: (*Schistosoma, Antigens and antibodies,), Immunology, Trichinella, Primates, Immune serums, Infections.

This report deals with the immunochemical characteristics of the water extracts of S. mansoni (cercarial and adults), mainly the overall antigenic potential and stability under various physico-chemical conditions (heat inactivation, effect of freezing and thawing, lyophilization and storage); partial fractionation and isolation of a number of protein antigens from cercarial and adult forms and their reactivity with anti-schistosome sera from natural human or experimental animal infections, cross-reactions between schistosomes and Trichinella antigen-antibody systems, the variable interactions between antibody and antigens depending upon the phase of the infection and the type of antigens used. (Author)

AD-429 386 Div. 16
OTS price $2.60

Johann Wolfgang Goethe U. (Germany).
STUDIES ON THE MECHANISM AND PREVENTION OF UV-STASIS IN CAPILLARIES.
Final technical and scientific rept., 1 Dec 62-30 Nov 63,
by Rudolf K. Zahn. 30 Nov 63, 13p.
Contract DA91 591EUC2738
Unclassified report

Descriptors: (*Capillaries, Blood circulation), Microscopes, Design, Physiology, Analysis, Effectiveness, Adenosine phosphates, Vitamin, Amino acids, Amides.

AD-429 419 Div. 16
OTS price $1.10

Hospital for Sick Children, Toronto (Canada).
ECOLOGY OF POWASSAN VIRUS,
by Donald M. McLean. 31 Jan 64, 3p.
Contract DA49 193md2402
Unclassified report

Descriptors: (*Viruses, Antigens & antibodies), Immunity, Disease vectors, Ecology, Mice, Ticks, Rabbits, Agglutinins.

AD-429 452 Div. 16
OTS price $12.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ACUTE RADIATION INJURIES AND THEIR TREATMENT (Ostryye Radiatsionnyye Porazheniya I Ikh Lecheniye),
by I. M. Poltavets, F. F. Sinitsyna, M. P. Filippov and M. P. Kolyada. 15 Oct 63, 175p.
FTD TT63 610 Unclassified report

Trans. from Gosudarstvennoye Meditsinskoye Izdatel'stvo USSR, Kiyev, pp. 3-155, 1962.

Descriptors: (*Radiation effects, Medicine), (*Radiation injuries, Medicine), (*Medicine, Radiation injuries), Nuclear explosions, Pathology, Wounds and injuries, Dosimeters, Health physics, Public health, Protective clothing, Handbooks.

AD-429 477 Div. 16
OTS price $1.60

Albert Einstein Medical Center, Philadelphia, Pa.
A TRACER AMINO ACID AS AN INDICATOR OF NITROGEN METABOLISM.
Progress rept. no. 1, 1 Oct 62-31 Dec 62,
by William Metcalf. 31 Dec 62, 9p.
Contract DA49 193md2205
Unclassified report

Descriptors: (*Nitrogen, Metabolism), (*Metabolism, Nitrogen), (*Amino acids, Tracer studies), (*Tracer studies, Amino acids), Steroids, Muscles, Laboratory animals.

The experiments reported are aimed at devising a simpler method of monitoring metabolism. Previous studies with seven different anabolic steroids on the uptake of the non-metabolizable amino acid, alpha-aminoisobutyric acid-1-C-14 (AIB), by the levator ani muscle of the rat have shown this to be an excellent indicator of anabolism. The levator ani uptake test was shortened from 39 to 25 hours without loss of sensitivity or reproducibility. Study of quantitative relationship between AIB uptake and glycine incorporation into various tissues suggests a fixed proportionality between the two. The experiment, however, was not entirely satisfactory technically and is to be repeated. The time course study of the distribution of AIB in normal and steroid stimulated rats indicates that the maximum general anabolic effect of the four steroids tested does not occur until 96 hours. The magnitude of uptake increase by the viscera and general skeletal muscle at 96 hours, 50 to 60%, indicates that these changes would be useful indicators of ''pure'' anabolism as distinct from the ''mixed'' anabolic and androgenic effect of the levator ani and other sexual tissues. (Author)

AD-429 484 Div. 16
OTS price $1.60

Naval Medical Research Inst., Bethesda, Md.
ELEVATION OF INTERNAL BODY TEMPERATURES DURING TRANSIENT HEAT LOADS AND AT THERMAL EQUILIBRIUM,
by L. Copman, D. Minard and A. R. Dasler.
17 June 63, 17p.
NMRI MR005 01 0001 02 1
Unclassified report

Descriptors: (*Body temperature, Stability), Stresses, Temperature, Exercise, Protective clothing, Tolerances (Physiology), Heart, Metabolism, Perspiration, Ear, Skin, Esophagus.

Thermoregulatory responses of human subjects undergoing heat stress were studied utilizing a variety of environmental conditions, clothing, and work rates. Internal body temperatures were measured in the lower esophagus, ear (tympanic membrane), and the rectum. Skin temperatures, heart rate, sweat rate, and metabolic rate were also measured. (Author)

AD-429 507 Div. 16
OTS price $1.10

Jefferson Medical Coll., Philadelphia, Pa.
THYROIDAL INFLUENCE ON ALTITUDE TOLERANCE,
by Domenic A. Debias and Wang Yen. Dec 63, 3p.
Contract AF41 657 253, Task 775801
SAM B TDR63 101 Unclassified report

Descriptors: (*Thyroid gland, Surgery), (*Surgery, Survival), Metabolism, Physiology, Measurements, Iodine, Tracer studies, Labeled substances, Adrenal glands, Erythrocytes.

This investigation aimed at obtaining support for the concept that lesser amounts of cortisol are effective in prolonging the survival time of thyroidectomized rats exposed to altitude because of a decreased catabolism of the steroid in hypothyroid animals. The data indicate that hyperthyroid animals are more susceptible to altitude exposure than are normal animals, and a greater amount of cortisol is required to protect altitude-exposed adrenalectomized animals that have also been thyroidectomized. Increased thyroid function in altitude-exposed animals is indicated by measurements on the following parameters which were increased: thyroidal uptake of I131, release of thyroidal I131, erythrocyte uptake of I131-labeled triiodothyronine. (Author)

AD-429 523 Div. 16
OTS price $2.60

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
PSYCHOLOGICAL ASPECTS OF WATER IMMERSION STUDIES,
by John C. Ferguson and Randall M. Chambers.
30 Dec 63, 23p.
NADC MA 6328; NAVMED MR005 13 0005 7
Unclassified report

Descriptors: (*Underwater, Psychomotor tests), (*Psychomotor tests, Underwater), Perception, Behavior, Sleep, Stress (Physiology), Emotions, Gravity, Simulation, Performance tests, Fatigue (Physiology), Physiology.

This report reviews the recent water immersion literature, placing special emphasis on the psychological aspects of these studies. The adequacy of water immersion as a technique for simulating weightlessness is discussed and its disadvantages are reviewed. Water immersion facilities and procedures are described and it was found that the wide variation in procedures brings about difficulties in comparing results. The areas of perceptual and motor performance, boredom and fatigue, sleep, orientation, and personality and emotional aspects of water immersion were selected as being of special psychological interest. A seven-day immersion study demonstrated a gross disruption of psychomotor performance, after the subject came out of the water. Studies of less duration showed no significant decrement in psychomotor performance, except for certain perceptual-motor tasks involving arm movements, where the disruption of the normal kinesthetic feedback was thought to be an important contributing factor. The studies also demonstrated that boredom is a factor which must be considered in immersion studies, but that subjects were able to tolerate boredom by sleeping or keeping active. Fatigue was found to be detrimental to performance in a seven day immersion study. (Author)

AD-429 526 Div. 16
OTS price $6.60

Federation of American Societies for Experimental Biology, Washington, D. C.
A STUDY OF THE MILITARY APPLICABILITY OF RESEARCH ON ASCORBIC ACID.
12 Aug 63, 1v.
Contract DA49 092AR09
Unclassified report

Descriptors: (*Ascorbic acid, Metabolism), Military medicine, Healing, Diet, Musculoskeletal system, Anemias, Bone, Teeth, Physiology, Collagen, Biosynthesis, Cold weather tests, Drugs, Deficiency diseases.

AD-429 537 Div. 16
OTS price $1.60

Washington School of Psychiatry, D. C.
AN EXPERIMENTAL ANALYSIS OF BEHAVIOR DURING SLEEP.
Annual progress rept., 1 Feb 63-31 Jan 64,
by John T. Hammack. 31 Jan 64, 15p.
Contract DA49 193md2180
Unclassified report

Descriptors: (*Sleep, Behavior), Conditioned response, Physiology, Electroencephalography, Rhythm (Biology), Stress (Physiology), Analysis, Cardiography.

A study is made on the nature of sleep as a behavioral and physiological state. Operant conditioning techniques are used to produce and control behavior in sleeping adults. Techniques of continuous measurement are employed to permit recording of behavioral and physiological data in invividual subjects over extended periods. Findings are reported from the following studies: pulse rate and EEG stages of sleep, duration and cycling of EEG sleep stages in normal states and after acute sleep deprivation, and behavioral discrimination of the REM phase by the sleeping subject. (Author)

AD-429 543 Div. 16
OTS price $2.60

Maryland U., College Park.
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN, AND CHINESE LITERATURE, VOLUME III,
ed. by George Anastos. 1964, 24p.
Contract DA49 193MD2238
Unclassified report

Descriptors: (*Bibliographies, Insects), (*Insects, Bibliographies), Disease vectors, Ticks, Pasteurella, Culicidae, Insecticides, Ecology, Siptionaptera, Diptera, Diseases, Epidemiology, Mites, Biological laboratories.

AD-429 762 Div. 16
OTS price $2.60

University Coll. of Wales (Gt. Brit.).
CAROTENOID BIOSYNTHESIS IN PHOTOSYNTHETIC BACTERIA AND HIGHER PLANTS,
by T. W. Goodwin. 9 Dec 63, 24p.
Contract AF61 052 355
AFOSR 64 0104 Unclassified report

Descriptors: (*Carotenoids, Biosynthesis), (*Photosynthesis, Bacteria), Plants (Botany), Distribution, Labeled substances, Corn, Metabolism, Microorganisms, Carbon compounds.

AD-429 765 Div. 16, 4
OTS price $4.60

Agriculture U., Wageningen (Netherlands).
PHYSICAL AND CHEMICAL STUDIES OF CHLOROPHYLL SYSTEMS. PROPERTIES OF PIGMENT-PROTEIN COMPLEXES PRESENT IN PHOTOSYNTHETIC BACTERIA,
by E. C. Wassink and G. H. M. Kronenberg.
Dec 63, 1v.
Grant AF EOAR62 30
AFOSR 64 0105 Unclassified report

Descriptors: (*Chlorophylls, Bacteria), (*Bacteria, Chlorophylls), Pigments, Proteins, Photosynthesis, Microorganisms, Chemical properties, Growth, Intensity.

This study is a continuation of work on properties of pigment-protein complexes in purple bacteria. The organism under investigation is Chromatium, strain D. Owing to the fact that our culture obviously contained an admixture, we have looked into methods for reisolating Chromatium from our culture. Isolation was successful by applying high concentrations of diphenylamine (DPA) in the culture medium, in which Chromatium appeared to develop much better than the admixture. Experiments performed with our reisolated Chromatium were compared with those obtained with other cultures, all listed Chromatium, strain D. (Author)

AD-429 771 Div. 16
OTS price $1.60

Massachusetts Mental Health Center, Boston.
SPECIAL MODIFICATIONS OF THE SILVER-SILVER CHLORIDE SPONGE ELECTRODE FOR SKIN RECORDING,
by D. N. O'Connell and B. Tursky. 1962, 10p.
Contract AF49 638 728
AFOSR 2116 Unclassified report

Published in Psychophysiology Newsletter, 8:2, pp. 31-37, 1962.

Descriptors: (*Electrodes, Skin), (*Galvanic skin response, Recording systems), Platinum, Silver compounds, Psychometrics, Resistance (Electrical).

Two modifications of the silver-silver chloride sponge electrode designed for ready attachment in a wide range of placements are described. The first modification is for permanent use in both the experimental and clinical situations. The second is for more specialized situations where re-use is not required. The core of the modified electrode is identical with that of the previously developed GSR type. so that they are also suitable for recording potential, resistance or impedance. (Author)

AD-429 777 Div. 16
OTS price $3.60

Technische Hochschule, Munich (Germany).
STUDIES ON THE CHANGE OF THE CONCENTRATIONS OF INTERMEDIATES DURING PHOTOSYNTHESIS OF CHLORELLA AND ISOLATED CHLOROPLASTS.
Final rept. no. 1,
by O. Kandler. 1 May 63, 27p.
Grant AF EOAR62 42
AFOSR 64 0021 Unclassified report

Descriptors: (*Photosynthesis, Tracer studies), (*Algae, Photosynthesis), Carbon dioxide, Carbon compounds, Illumination, Labeled substances, Adenosine phosphates, Metabolism, Cyanides.

The changes in the concentrations of intermediates and the distribution of C(14) after photosynthesis in C(14)02 by Chlorella and isolated chloroplasts was measured under different conditions of photosynthesis and under the effect of metabolic inhibitors. The following results were obtained. (1) The changes in the concentrations of intermediates in Chlorella during the transition from light to dark and vice versa are independent of CO2, but dependent on anaerobiosis. (2) In Chlorella photosynthesis is inhibited even by a concentration of monoiodoacetic acid which is 100 times lower than that inhibiting respiration. The beginning of inhibition is indicated by an accumulation of labeled PGA. (3) When Chlorella is illuminated in the presence of KCN, the radioactive PGA formed during a preceding period of photosynthesis in C(14)02, is still reduced to sugar without a change in the total quantity of PGA in the cell. (4) Arsenate and DNP do not lead to an accumulation of PGA, but do inhibit the formation of RuDP. (5) The distribution of radioactivity on the paper chromatograms showed that ATP and ADP are the first labeled compounds under the two conditions. (Author)

AD-429 779 Div. 16
OTS price $6.60

Istituto Nazionale di Ottica, Florence (Italy).
RESEARCH ON RETINAL MECHANISMS AND RESPONSES,
by M. Bittini, A. M. Ercoles, A. Fiorentini and L. Ronchi. 31 Oct 63, 60p.
Grant AF EOAR63 4
AFOSR 64 0103
Unclassified report

Descriptors: (*Eye, Scientific research), Vision, Stimulation, Illumination, Sensitivity, Visual acuity, Thresholds (Physiology), Determination, Images, Retina.

The present report is divided into the following six parts: (A) The interactions between the responses to visual stimuli stabilized on the retina; (B) The investigation of the effects of the stimulation of one eye on the ERG recorded from the other eye; (C) Some peculiar interaction effects occurring under differential binocular adaptation; (D) The acquisition times relative to the learning of various visual functions are reported; (E) Some suprathreshold phenomena which find their explanation in terms of retinal interaction effects possibly mediated through lateral inhibition; (F) Some irregularities of sensitivity to luminance differences which are unexpected when the smooth behaviour of the Weber-Fechner function is taken in mind. (Author)

AD-429 802 Div. 16
OTS price $4.60

New York State Coll. of Agriculture, Cornell U., Ithaca.
NOTE ON THE PROPORTION OF GENETIC DEVIATES IN THE TAILS OF A NORMAL POPULATION,
by D. S. Robson and LeRoy Powers. 1963, 38p. TR13
Contract Nonr401 39, Proj. NR042 212 Unclassified report

Descriptors: (*Population, Genetics), (*Genetics, Mathematical analysis), Environmental tests, Selection, Probability.

AD-429 803 Div. 16
OTS price $1.00

IIT Research Inst., Chicago, Ill.
RESEARCH ON THE CHEMICAL COMPOSITION AND DIGESTIBILITY OF ALGAL CELL WALLS.
Rept. for 10 Oct 62-31 Aug 63,
by Milton J. Becker and Alan M. Shefner. Nov 63, 28p. Rept. no. L6002 4
Contract AF33 657 10066, Proj. 7164, Task 716403
AMRL TDR63 115 Unclassified report

Report on Space Biology Research.

Descriptors: (*Algae, Membranes (Biology), (*Membranes (Biology), Chromatographic analysis), Purification, Chemical analysis, Cells (Biology), Carbohydrates, Glucose, Monasaccharides, Growth.

Cell walls of the alga Chlorella pyrenoidosa 7-11-05 were isolated and purified. The carbohydrates present as monosaccharides in the purified cell walls and in chemical fractions of the cell walls were analyzed by paper chromatography and thin layer chromatography (TLC). Rhamnose, glucose and galactose were the predominant monosaccharides. Arabinose was not present in significant quantities in the cell walls or fractions thereof. Conditions for the large scale heterotrophic growth of C. pyrenoidosa (7-11-05) were explored and found to be feasible. Studies on the growth and partial digestion of the algal cells by a fungus, Aspergillus oryzae, were found to be feasible. Such studies were oriented towards controlled feedings of the alga, the alga-fungus mixture and the fungus to young rats. (Author)

AD-429 816 Div. 16
OTS price $1.60

IIT Research Inst., Chicago, Ill.
DEVELOPMENT OF AN ORALLY EFFECTIVE INSECT REPELLENT.
Quarterly progress rept., 1 Nov 63-31 Jan 64, by Harbans Lal. 31 Jan 64, 10p. Rept. no. C222 7
Contract DA49 193md2281, IITRI Proj. C222 Unclassified report

Descriptors: (*Insect repellants, Mouth), (*Organic compounds, Insect repellants), Culicidae, Esters, Blood, Amides, Membranes (Biology).

Several compounds were tested for their effectiveness in preventing mosquitoes from biting mice and from ingesting blood through an animal membrane. Of the compounds tested, only N-amyl succinamide and allethrin were effective at a concentration of 0.1 mg/ml. Allethrin was effective both in vitro and in vivo at a concentration of 0.001 mg/ml. Work on succinamides and allethrin will be continued. Evaluation of other compounds in vitro and in vivo will also be continued. In addition, tests are being designed to detect mosquito biting in the absence of blood sucking. (Author)

AD-429 848 Div. 16, 30
OTS price $1.60

Naval Missile and Astronautics Center, Point Mugu, Calif.
AN ELECTRICAL IMPEDANCE PLETHYSMOGRAPH,
by C. G. Phipps and G. G. Lucchina. 31 Jan 64, 15p.
NMC TM63 47 Unclassified report

Descriptors: (*Rhythm (Biology), Recording systems), (*Recording systems, Rhythm (Biology)), Heart, Respiration, Blood circulation, Electrical impedance.

An electrical impedance plethysmograph has been developed at the Naval Missile Center. This plethysmograph is extremely flexible and sensitive in that it can be adapted to the acquisition of impedance changes relative to vascular volumes and to obtain data on heart rate and rhythm, and respiratory cycle. Results obtained included indications that a trace could be made which would be directly related to the blood flow through a section of a limb. With this instrumentation, traces representing the impedance cycle before, during, and after vascular systolic occlusion in a limb were obtained. An indirect index of systolic pressures could also be derived. (Author)

AD-429 938 Div. 16
OTS price $1.10

Minnesota U., Minneapolis.
THORACIC CAGE IMPEDANCE MEASUREMENTS. CANCELLATION OF RESPIRATION EFFECTS ON TRANSTHORACIC IMPEDANCE,
by Edwin Kinnen and William Kubicek. Dec 63, 7p.
Contract AF41 657 403, Task 775801
SAM B TDR63 99 Unclassified report

Descriptors: (*Heart, Cardiography), (*Cardiography, Electromagnetic waves), (*Thorax, Cardiography), Respiratory system, Waveform generators, Electrical impedance, Electrodes, Medical equipment, Filters (Electromagnetic wave).

Monitoring transthoracic electrical imedance related to cardiac activity has been hampered

by changes in the measured impedance due to respiration. It is necessary to nullify respiration effects if a relatively undistorted cardiac activity waveform is to be recorded continuously during respiration. Both direct filtering and subraction of the respiration signal from the composite respiration-cardiac waveform were considered. Methods used to obtain a respiration signal for subtraction purposes were based on (1) a chest circumference measurement obtained with a bellows and pressure transducer, (2) the detection of an impedance change due solely to respiration, and (3) the utilization of the phase-angle signal associated with the transthoracic impedance. Promising results were obtained when the phase-angle signal was combined with the composite respiration-cardiac waveform. The effect of repiration impedance change on the resulting waveform was less than 50% of the cardiac activity signal under resting-breathing conditions. (Author)

AD-429 963 Div. 16
OTS price $2.60

Columbia U., Coll. of Physicians and Surgeons, New York.
STUDIES ON BLOOD VISCOSITY AT LOW SHEAR RATES.
Annual progress rept., 1 Apr-31 Dec 63,
by Magnus I. Gregersen. 31 Dec 63, 27p.
Contract DA49 193md2272
Unclassified report

Descriptors: (*Blood, Viscosity), Heparin, Fibrinogen, Cells (Biology), Molecular weight, Blood cells, Toxins & antitoxins, Blood plasma, Biochemistry, Hemoglobin, Stress.

At low shear rates the logarithm of viscosity of heparinized and defibrinated blood obtained from man and dogs shows a linear relationship with the volume per cent of cells. Analyses of such semilog plots indicate that the dependence of plasma viscosity on shear rate can be attributed to the presence of fibrinogen and that the dependence of blood viscosity on volume per cent cells is unaltered by the removal of fibrinogen. Dextran preparations obtained from two different sources have similar effects on blood viscosity which increases in proportion to the molecular weight and the concentration of the dextran used. At a given shear rate and for a given cell percentage, the viscosity of heparinized blood obtained from five species of animals (elephant, man, dog, sheep, goat) shows a direct relationship to the mean corpuscular volume (MCV). Such correlation between viscosity and MCV is less marked in Ringer-washed cell suspensions prepared from the blood of these species. Shrinkage of red cells by washing with a hypertonic solution results in an increase of mean corpuscular hemoglobin concentration (MCHC) and a rise of viscosity. Swelling of red cells by washing with a hypotonic solution causes a decrease of MCHC and a lowering of viscosity. In endotoxin shock, the outward filtration of plasma fluid across capillary walls is accelerated and the concentration of macromolecules in this fluid is also increased. (Author)

AD-429 965 Div. 16
OTS price $1.60

Baylor U., Coll. of Medicine, Houston, Tex.
ELECTROPHYSIOLOGIC CHARACTERISTICS AND INTERPRETATION OF SKIN POTENTIALS.
by Robert Edelberg. Nov 63, 14p.
Contract AF41 609 1527, Task 775102
SAM B TDR63 95 Unclassified report

Descriptors: (*Skin, Galvanic skin response), (*Galvanic skin response, Analysis), Electrolytes, Stimulation, Membranes (Biology), Electrical properties, Glands.

The relation of skin potential and endosomatic GSR to surface electrolytes reveals that the surface layer cannot explain the total potential difference across the skin. Furthermore, wide variations in surface potential induced by varying electrolyte concentrations have no effect on the GSR. Results are consistent with a base potential generated by two membranes in series-an outer one accessible to surface electrolytes but not participating in the GSR, an inner one inaccessible to surface media but responsible for the positive component of the GSR. Microelectrode studies show there is a third structure in parallel, the sweat gland, which has different electrical characteristics and produces negative endosomatic waves. The two endosomatic GSR components manifest stimulus response specificity and are apparently under independent neural control. (Author)

AD-429 966 Div. 16, 28
OTS price $1.60

School of Aviation Medicine, Brooks Air Force Base, Tex.
APPARENT CHANGE OF REPETITIVE NOISE BURSTS,
by Lois L. Elliott. Oct 63, 13p.
Task 775503
SAM B TDR63 72 Unclassified report

Descriptors: (*Noise, Illusions), (*Illusions, Noise), Neurology, Physiology, Auditory nerve, Analysis, Hearing, Theory, Psychiatry.

Noise bursts which are presented at constant, slow flutter rates through wide-range earphones appear to change in rate and loudness. This illusion is discussed in terms of neurophysiologic evidence and auditory theory. (Author)

AD-429 989 Div. 16
OTS price $5.60

Schellenger Research Labs., Texas Western Coll., El Paso.
ELECTROCHEMICAL PROCESSES IN TOOTH DESENSITIZATION.
Annual progress rept., 1 Dec-30 Nov 63,
by Harold M. Foster and William Beaumont.
30 Nov 63, 56p.
Grant DA MD49 193 63G95
Unclassified report

Descriptors: (*Electrochemistry, Dentistry), (*Dentistry, Electrochemistry), Teeth, Sensitivity, Electrolytes, Resistance (Electrical), Instrumentation, Test equipment, Ionization, Stimulation, Electric currents.

Thirty-nine teeth on eleven patients were treated. Thirteen of the teeth served as controls. The control teeth were treated in the same manner as the experimental teeth except that they were not ionized. Sixteen per cent (4) of the 26 experimental teeth responded with desensitization. Four per cent (1) exhibited immediate-complete desensitization. Recovery of sensitivity was also noted in 8% (2) teeth with immediate-complete desensitization. No desensitization was observed in 84% (22) of the teeth treated. General observations made on the teeth within this category showed that (1) teeth that were more difficult to prepare (harder enamel and dentin) had higher electrical resistances than those which were easily prepared and (2) patients

that spent their childhood in areas having naturally occurring fluorides in the water supply had higher electrical resistances in their teeth than those patients who spent their childhood in areas that lacked natural fluoridation. (Author)

AD-430 018 Div. 16
OTS price $1.10

New York State U., Albany.
INVESTIGATION INTO THE MODE OF ACTION OF THE LATERAL LINE SYSTEM OF FISH.
Final rept., 1 Jan-31 Dec 63,
by E. E. Sucklin and J. A. Sucklin. 8 Jan 64, 11p.
Grant Nonr G0032 63 Unclassified report

Descriptors: (*Fishes, Sense organs), (*Sensory mechanisms, Vibration), Nerves, Neurology, Anatomy, Physiology, Sensitivity.

An investigation is reported of the mode of action of the trunk lateral line organ of fish as a sensory system. The techniques of electrophysiology are used. (Author)

AD-430 032 Div. 16
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE EFFECT OF TRANSVERSE ACCELERATION ON OXYGEN TENSION IN BRAIN TISSUE,
by Ye. A. Kovalenko, V. L. Popkov and I. N. Chernyakov. 16 Jan 64, 12p.
FTD TT63 1215 Unclassified report

Trans. from Fiziologicheskiy Zhurnal SSSR im. I. M. Sechenova, 49:10, pp. 1145-1149, 1963.

Descriptors: (*Acceleration tolerance, Brain), Posture, Hypoxia, Electroencephalography, Dogs, Physiology.

AD-430 064 Div. 16
OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
CORRELATION OF DISSOLVED NITROGEN IN WHOLE BLOOD WITH SELECTED WHOLE BLOOD CONSTITUENTS,
by Omar V. Greene, Jr. Dec 63, 10p.
Task 775801
SAM B TDR63 92 Unclassified report

Descriptors: (*Blood, Nitrogen), Blood chemistry, Measurement, Lipids, Water, Blood plasma.

The relationship of several whole blood constituents to the quantity of nitrogen in solution in the blood was studied by correlating the measured quantities of each with the amount of nitrogen present. The constituents and their mean values were as follows: whole blood lipids-589.62 mg. %; plasma lipids-598.45 mg. %; total blood water-77.33 %; hematocrit-46.12 %. The mean value for nitrogen is solution was 0.01273 ml. per milliliter of whole blood (Bunsen solubility coefficient). With the exception of hematocrit versus nitrogen, all correlation coefficients were found to be negative. None of the correlations were found to be significant. (Author)

AD-430 067 Div. 16, 29
OTS price $5.60

Army Natick Labs., Mass.
EFFECT OF REDUCED RATION AND METHOD OF LOAD CARRYING ON PHYSICAL FITNESS AND ENERGY EXPENDITURE OF SMALL GROUPS OF MEN OPERATING ON THE GREENLAND ICECAP,
by Marlin B. Kreider, John A. Vaughan and Thomas Dee. July 61, 55p.
Proj. 7x83 01 008
ANL TR EP160 Unclassified report

Descriptors: (*Physical fitness, Nutrition), Energy, Metabolism, Respiration, Exercise, High altitude, Fatigue (Physiology), Performance tests.

It was found that a reduction of caloric intake of about 40% below the voluntary intake and a resultant 4.5% decrease of body weight during 10 days of hard work did not noticeably effect the performance on the Harvard step test in spite of the high level of exercise and also low motivation. There was, however, subjective evidence of deterioration in the form of a greater sense of fatigue, a lack of enthusiasm, and an increased irritability. Other tests for fitness, the treadmill test and subjective evaluation, did not correlate closely with the Harvard step test. Even though the energy cost of work on the icecap decreased from the beginning to the end of the 10-day experimental period, the reduction was not greater on the reduced ration than on the full ration on a body-weight basis. A load was pulled more easily on sled than carried partly on the sled and partly on the back on the type of snow surface. At around 7,000 feet there was an increase of 8% of the respiratory volume above that at sea level after adjustment to standard temperature and pressure. The volume of inspired air during performance of the mild step test remained higher for at least 12 days after return to sea level, but dropped to the lower level by 19 days at sea level. (Author)

AD-430 095 Div. 16
OTS price $2.60

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
PSYCHOPHYSIOLOGICAL ASPECTS OF REDUCED GRAVITY FIELDS,
by Cleto Di Giovanni, Jr. and Randall M. Chambers. 30 Dec 63, 29p.
NADC MA 6305; NAVMED MR005 13 0005 7, Rept. no. 6 Unclassified report

Descriptors: (*Weightlessness, Space medicine), Physiology, Cardiovascular system, Psychomotor tests, Simulation, Stress (Physiology), Posture, Exercise, Perception, Visual acuity, Musculoskeletal system, Hypotension, Underwater.

Considerable data have been collected concerning acceleration physiology from centrifuge, rocket sled, and drop tower studies but weightlessness has remained a poorly understood environment primarily because there is no way to duplicate it on earth. This report considers the various methods used to study or approximate the subgravity state and the results and extrapolations that have been drawn from them. The cardiovascular and musculoskeletal aspects of recent bed rest and water immersion studies are examined and results are compared with the data from actual space flights. Real weightlessness apparently has been an innocuous environment thus far, and the only factor of concern has been a tendency toward postural hypotension detected immediately following recovery after missions of 9 and 34 hours. As longer missions are achieved, other problems, such as muscle atrophy and excessive calcium mobilization, may appear. Psychomotor and

psychological functions apparently have not been adversely affected by subgravity, thus far. Until weightlessness becomes a better understood environment, effective hypogravic protective techniques will be difficult to devise. (Author)

AD-430 113 Div. 16
OTS price $1.10

Kansas U., Lawrence.
SURVEY OF MIDDLE AMERICAN TERRESTRIAL VERTEBRATES AND THEIR ECTOPARASITES.
Annual progress rept., 1 Jan-31 Dec 63,
by J. Knox Jones, Jr. 31 Dec 63, 5p.
Contract DA49 193md2215
Unclassified report

Descriptors: (*Parasites, Distribution), Man, Animals, Diseases.

Field work to collect terrestrial vertebrates and their ectoparasites was conducted on the Yucatan Peninsula (states of Campeche and Yucatan, and Territory of Quintana Roo) of Mexico in July and August, 1962, and in western Mexico (states of Baja California Sur, Nayarit, Sinaloa, and Sonora) in June, July, and August, 1963. Vertebrates obtained in both years have been catalogued in the Museum of Natural History, The University of Kansas; some already are under study. Ectoparasites collected in 1962 have been sent to specialists for study, along with mineographed lists containing data for hosts. Ectoparasites obtained in 1963 will be distributed to specialists in February, 1964. (Author)

AD-430 155 Div. 16
OTS price $1.60

Chicago U., Ill.
STUDIES ON THE CHEMOTHERAPY OF CHLOROQUINE-RESISTANT FALCIPARUM MALARIA, VIVAX MALARIA, AND PRIMAQUINE HEMOLYSIS.
Annual progress rept., 1 Aug 62-1 Jan 64,
by Alf S. Alving. 1 Jan 64, 12p.
Contract DA49 193MD2413
Unclassified report

Descriptors: (*Chemotherapeutic agents, Hemosporidia), Diseases, Sensitivity, Antimalarials, Erythrocytes, Enzymes, Hemolysis, Physiology, Drugs.

Detailed studies have been carried out with four strains of chloroquine-resistant P. falciparum. The strain from Colombia, South America is resistant to chloroquine, hydroxychloroquine, amodiaquin, and 377C54, and is sensitive to pyrimethamine and quinine. The three strains from Southeast Asia are resistant to chloroquine, hydroxychloroquine, amodiaquin, atabrine, chlorguanide, and 377C54; these three strains vary in their response to pyrimethamine and quinine. Studies have also been carried out on (1) the activities of hexokinase and glyceraldehyde-3-phosphate dehydrogenase during primaquine-induced hemolysis and (2) the relationship between the activities of these two enzymes and the age of the human red cell. (Author)

AD-430 236 Div. 16
OTS price $3.60

Naval Radiological Defense Lab., San Francisco, Calif.
A RENAL LESION ASSOCIATED WITH DIURESIS IN THE AGING SPRAGUE-DAWLEY RAT,
by W. A. Foley, D. C. Jones, G. K. Osborn and D. J. Kimeldorf. 20 Dec 63, 37p.
NRDL TR703; NAVWED MR005 08 5201
Unclassified report

Descriptors: (*Rats, Kidney function tests), (*Kidneys, Aging (Physiology)), Diseases, Enzymes, Diuretics, Tissues (Biology), Pathology, Metabolism disorders, Morphology (Biology), Histologic techniques, Consumption, Water.

Water balance measurements were combined with a morphologic and histochemical evaluation of selected organs in an attempt to elucidate mechanisms underlying the relatively abrupt increase in water consumption which occurs late in life in an appreciable proportion of male Sprague-Dawley rats. After habituation, food and water consumption, urinary volume and specific gravity, and body weight were measured over a 24-hour period in a metabolism cage. Immediately after the metabolic measurements the animals were sacrificed and the adrenals and kidneys weighed. Histopathologic examinations of pituitary, thyroid, parathyroid, adrenal, kidney and liver tissues were made. Histochemical studies of selected renal enzyme activities were made on all old animals (23 in the high and 24 in the low intake groups) and on an additional group of young animals (1 to 5 months of age) as controls for age effects. No relationship could be established between a variety of histologic lesions detected in endocrine organs and water intake. Special staining for anti-diuretic hormone failed to provide evidence of a diabetes insipidus-like state as the basis of the increased water consumption and diuresis. (Author)

AD-430 331 Div. 16
OTS price $1.60

Biological Labs., Harvard U., Cambridge, Mass.
STUDIES ON THE MODE OF ACTION OF DIPHTHERIA TOXIN.
Annual rept., 1 Mar 63-28 Feb 64,
by A. M. Pappenheimer, Jr. 28 Feb 64, 24p.
Contract DA49 007md994
Unclassified report

Descriptors: (*Toxins & Antitoxins, Corynebacterium), Bacteriophages, Physiology, Labeled substances, Cells (Biology), Metabolism.

Using tritium-labelled toxin, it was shown that HeLa cells treated with a saturating dose take up less than 2% (0.005µg/ml) of the added toxin within a 5-hour period. Diphtheria toxin exerts its action on cells by inhibition of protein synthesis. Low concentrations of toxin block the incorporation of C14-amino acids into protein in extracts of HeLa cells and of rabbit reticulocytes. It was shown that the toxin interferes with a step involving the transfer of aminoacids from aminoacyl-sRNA to the growing polypeptide chain. A method for phage assay has been developed using an anti-head protein serum gammaglobulin fraction, trace labelled with I131. Bacteria to which 4 or more phage particles have been absorbed are specifically agglutinated by the serum. As determined by the I131 method, the classic PW8 strain releases less than 2% as much absorbable phage following UV induction as do P(beta d) under similar conditions. (Author)

AD-430 359 Div. 16
OTS price $8.10

Radiation Research Associates, Inc., Fort Worth, Tex.
IONIZING IRRADIATION AND ITS EFFECTS UPON HEALING WOUNDS.

Annual progress rept., 1 Jan-31 Dec 63,
by B. L. Reynolds. 2 Feb 64, 84p. Rept. no. T42
Contract DA49 193md2368
Unclassified report

Descriptors: (*Radiation injuries, Phase studies, (*Biochemistry, Muscles), Rats, Tissue extracts, Chemical analysis, Steroids, Survival, Shock (Pathology), Healing.

Radiation injury from exposure of 100 to 1000r in albino rats produces changes in chemical parameters of body tissues which appear to be phasic in character, particularly in striated muscle, lung, arolear connective tissue, and liver. Even in those animals that do not survive exposure to total body irradiation the phasic phenomenon is observed, although reduced in quantity and frequently in quality of the response. Comparison is made to other forms of injury investigated by other observers and ourmay be seen to behave in like fashion, with the phasic phenomenon. Examinations of striated muscle in animals subjected to total body irradiation allow an appraisal with respect to phasic occurrence, such that gradation of response to the total trauma may be suggested. Suggestions for therapy are based upon the gradation response. A critique of the methodology in sampling, analysis, and interpretation is offered for a more realistic appraisal of this and related work. (Author)

AD-430 363 Div. 16
OTS price $1.60

School of Aviation Medicine, Brooks Air Force Base, Tex.
CELLULAR OXYGEN CONSUMPTION AT LOW OXYGEN TENSIONS,
by Robert J. Reyes and J. Ryan Neville.
Nov 63, 11p.
Task 775801
SAM TDR63 68 Unclassified report

Descriptors: (*Cells (Biology), Oxygen consumption), (*Aerobiology, Cells (Biology)), Fungi, Saccharide phosphate, Low pressure research, Temperature, Metabolism, pH, Mercury, Phosphates, Molds, Tables, Yeasts, Spores.

As part of a preliminary investigation into certain aspects of exobiology, a baseline study has been made of various factors including pH, cell concentration, temperature, and metabolic state which might affect the critical oxygen tension (C. O. T.) of Saccharomyces cerevisiae. The metabolic state and temperature are found to have a significant effect on the C.O.T. The C.O.T. in the starved condition is independent of temperature, while the exogenous state exhibits an increase in C. O.T. with an increase in temperture. A comparison of the C.O.T. value at 25 C. gave approximately 4mm. Hg Po2 in the exogenous state and less than 1 mm. Hg Po2 in the starved state. These results, in general, confirm earlier studies. No effect of the C.O.T. by pH or cell concentration changes could be found. The C. O. T. of cytochrome-deficient Neurospora crassa mutants has been compared with that of normal strain and no difference was observed. The polarographic methodology as applied to cellular oxygen consumption is described, and the practical significance that the C. O. T. measurement may have in study of cellular processes is discussed. (Author)

AD-430 364 Div. 16
OTS price $1.60

Northrop Space Labs., Hawthorne, Calif.
EVALUATION OF CERTAIN MARINE ALGAL FLAGELLATES FOR MASS CULTURE,
by Richard W. Eppley. Nov 63, 15p.
Contract AF41 609 1608, Task 793001
SAM B TDR63 91 Unclassified report

Descriptors: (*Algae, Ecology), (*Tissue culture, Algae), Marine biology, Genetics, Photosynthesis, Growth, Light, Sun, Salinity, Mutations, Time.

Environmental requirements are reported for maximum growth of ten strains of marine flagellates of the group Volvocales. Three strains display growth rates above average for green algae: Dunaliella tertiolecta, D. primolecta, and Tetraselmis tetrathele. The algae examined display a spectrum of salinity optima, allowing selection of a strain suitable for mass culture in water of most any available salt content. The temperature optimum for growth is found to vary with the salt concentration of the growth medium for D. tertiolecta. All strains so far examined are unusually tolerant of urea, although not all can use urea as a source of nitrogen for growth. First attempts to obtain mutants capable of utilizing bright light were unsuccessful but provided data on pigment composition and photosynthetic rates of algal cells adapted to growth in light about 1.5 times as intense as sunlight. (Author).

AD-430 366 Div. 16
OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
SHELF LIFE OF AQUEOUS SOLUTIONS OF STANNOUS FLUORIDE,
by Ira L. Shannon and William A. Gibson.
Dec 63, 8p.
Task 775602
SAM TDR63 104 Unclassified report

Descriptors: (*Teeth, Diseases), (*Fluorides, Inhibition), (*Effectiveness, Storage), Tin compounds, Aging (Materials), Solutions.

The effect of age on the ability of 10% aqueous solutions of stannous fluoride to protect enamel surfaces from acid decalcification was evaluated in vitro. Solution ages ranged from fresh to 18 months. There was no significant loss of protective effectiveness associated with the age of the stannous fluoride solutions. (Author)

AD-430 367 Div. 16
OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
IDENTIFICATION AND SIGNIFICANCE OF PAROTID FLUID CORTICOSTEROIDS,
by Fred H. Katz and Ira L. Shannon. Oct 63, 12p.
Task 775602
SAM TDR63 86 Unclassified report

Descriptors: (*Body fluids, Identification), (*Corticosteroid agents, Identification), Tissue (Biology), Dogs, Radioactive isotopes, Estrogens, Injections, Laboratory animals, Adrenal glands.

Parotid fluid, which can be easily collected in continuous fashion, was previously shown to possess free 17-hydroxycorticosteroid (17-OH-CS) levels which paralleled those in serum and reached a maximum two hours after corticotropin or cortisol administration to normal men. The present study demonstrated that intravenously administered cortisol rapidly appeared in the

parotid fluid, and that, thus, parotid fluid 17-OH-CS levels would serve as reliable indicators of adrenal function. This was borne out by studies in a patient with Cushing's syndrome as well as in those showing adrenal hyporesponsiveness. Despite the large rise in plasma 17-OH-CS in the third trimester of pregnancy there was only a small, though significant, rise in parotid fluid 17-OH-CS. These data are compatible with the hypothesis that only non-protein-bound free 17-OH-CS reach the parotid fluid. Conjugated 17-OHCS were not found in appreciable quantity in parotid fluid. Chemical and radioisotopic technics indicated cortisol and cortisone to be the major human parotid fluid 17-OH-CS. (Author)

AD-430 389 Div. 16
OTS price $1.10

Liege U. (Belgium).
GENETIC DETERMINANTS OF COLICIN PRODUCTION, PRINCIPALLY THEIR RELATION WITH BACTERIOPHAGES AND WITH THE F AGENT OF FERTILITY.
Annual technical rept. no. 3 (Final), 1 Dec 62-30 Nov 63,
by Pierre Fredericq. 30 Nov 63, 9p.
Contract DA91 591EUC2757
Unclassified report

Descriptors: (*Genetics, Escherichia), (*Escherichia, Genetics), Analysis, Microorganisms, Fertility, Bacteriophages.

Many recombinants obtained in crosses of wild strain E.coli K260, carrying V and B colicinogenic factors linked to an F agent, with F- strains, carrying a deletion in the try region, are partial diploids, heterozygous for the try marker. They have been analyzed in conjugation and transduction experiments. Crosses of such partial diploids with F- strains carrying various mutations in the oys, try region reveal that the partial diploids are of the F'type, carrying an episome in which all the genes from the try region, including cysB and T1, are linked to an F agent and to col factors V and B. As all the known markers from the episome are transferred together without segregation. In transduction experiments, segregation of the markers was obtained. Only 2% of the transductants are colicinogenic; most of them receiving V alone; some B alone and very few V and B together. The latter are also the only ones which receive the F agent of the donor and are able to transfer at a high rate the col factors with the try genes to other strains. In transduction experiments to strains already carrying an F agent, the presence of the F agent greatly favors establishing the transduced episome. (Author)

AD-430 394 Div. 16
OTS price $1.60

Civil Aeromedical Research Inst., Oklahoma City, Okla.
INFLIGHT LOSS OF CONSCIOUSNESS - A CASE REPORT,
by Pei Chin Tang and J. Robert Dille. Sep 63, 17p.
CARI 63 21 Unclassified report

Descriptors: (*Pilots, Attention), (*Vertigo, Diagnosis), (*Sensory deprivation, Pilots), Flight, Electroencephalography, Ear, Stimulation, Wave transmission, Therapy, Test methods.

A case of inflight vetigo and loss of consciousness in a private pilot, flying alone, is presented. The differential diagnosis and the significance of the findings of 5-7 per second theta waves in his resting EEG and high voltage slow waves during caloric irrigation of his right ear are discussed. (Author)

AD-430 427 Div. 16
OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
INACTIVATION OF STANNOUS FLUORIDE BY CALCIUM PYROPHOSPHATE,
by Ira L. Shannon and William A. Gibson. Dec 63, 8p.
Task 775602
SAM B TDR63 102 Unclassified report

Descriptors: (*Teeth, Disease), (*Inhibition, Fluoride), (*Interference, Calcium compounds), Effectiveness, Tin compounds, Phosphates, Alcohols.

A total of 240 extracted human teeth utilized in studying the compatibility of stannous fluoride with calcium pyrophosphate in water-glycerin solutions. The ability of 0.4% stannous fluoride solutions containing calcium pyrophosphate to protect against acid decalcification decreased significantly after 28 days. Over this period the protection afforded dropped from 44.2 to 14.4%. The presence of glycerin interfered with the protective performance of fresh solutions and led to a decrease in effectiveness with time that was not seen with purely aqueous solutions. These findings reaffirm that, while the performance of stannous fluoride was not significantly affected by the presence of stannous pyrophosphate, the incorporation of calcium pyrophosphate led to a significant degeneration in the ability of stannous fluoride to protect the enamel surface from acid decalcification. (Author)

AD-430 440 Div. 16
OTS price $17.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PLUTONIUM-239. ITS DISTRIBUTION, BIOLOGICAL EFFECT AND ACCELERATED ELIMINATION. (Plutoniy - 239 Raspredeleniye, Biolgicheskoye Deystviye, Uskoreniye Vyvedeniya).
27 Nov 63, 278p.
FTD TT63 559 Unclassified report

Trans. from Gosudarstvennoye Izdatel'stvo Meditsinskoy Literatury Medgiz-1962, pp. 1-168, 1962.

Descriptors: (*Plutonium, Radiobiology), (*Radiobiology, Plutonium), Distribution, Excretion, Bone, Tissues (Biology), Biosynthesis, Radioactive isotopes, Radiation injuries, Pathology, Blood, Toxicity, Laboratory animals.

AD-430 456 Div. 16
OTS price $1.10

Alpha Research and Development, Inc., Blue Island, Ill.
A FEASIBILITY STUDY-NON-SURGICAL EXTRACTION OF TEETH.
Final technical rept., Feb 63-Jan 64,
by Robert L. Patrick. Jan 64, 9p.
Contract DA49 193md2385
Unclassified report

Descriptors: (*Dentistry, Surgery), Teeth, Acids, Feasibility studies, Organic compounds, Hydrolysis, Medical research.

A feasibility study was carried out to examine the potential extraction of teeth by nonsurgical

means. A series of hydrolytic materials were considered for hydrolyzing the collagenaceous fibers which hold teeth in their sockets. Strong organic acids having pKA values from 0.38-2.98 were examined. Several of these materials successfully hydrolyzed desiccated collagen in modest periods of time. In addition, mineral acids were examined and successful. Gelling systems were studied for use as holding agents and rate controllers. Rubber lattices were considered as root-canal-blocking agents. The feasibility of removing teeth by this method was demonstrated by utilizing bovine jaw sections. Blocking of the root canal was difficult with these sections, however. (Author)

AD-430 479 Div. 16, 28
OTS price $1.60

Indiana U., Bloomington.
PSYCHOLOGICAL AND PHARMACOLOGICAL FACTORS CONTROLLING GASTRO-INTESTINAL MOTILITY.
Summary progress rept. no. 5, Jan 63-Jan 64,
by Roger W. Russell. Jan 64, 17p.
Contract DA49 193md2063
Unclassified report

Descriptors: (*Gastrointestinal system, Motor reaction), Sensory deprivation, Control, Drugs, Psychology, Pharmacology, Stimulation, Ulcers, Secretion, Stomach.

The report describes current findings in our continuing studies of the effects of response-contingent stimulation on g.i. activity. The results of the several experiments so far completed and analyzed suggest that the difference in effects in terms of the physical characteristics of the auditory stimulus, of sensory processes per se, or of motor output. Studie of effects of experimentally-produced gastric lesions on electrophysiological measures of g.i. activity are also continuing. Such a procedure obviously led to a possible confounding of the effects of histamine and of the anesthetic in the records obtained. We have developed a restrainer for use with the confinement procedure, which permits excellent electrophysiological recording. Pilot studies have been completed and the experiments proper are now underway. Other studies described in the report include: effects of variation in visual and auditory stimulation on g.i. motility, effects of alternate response-contingent and random auditory stimulation on g.i. motility, and effects of dextro-amphetamine sulfate on g.i. activity. (Author)

AD-430 518 Div. 16
OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
PHYSIOLOGIC EFFECTS OF EXPOSURE TO INCREASED OXYGEN TENSION AT 5 P.S.I.A.,
by T. E. Morgan, Jr., R. G. Cutler, E. G. Shaw, F. Ulvedal, and J. J. Hargreaves. Oct 63, 5p.
Task 793002
SAM TDR63 64 Unclassified report

Descriptors: (*Oxygen, Physiology), (*Spacecraft cabins, Simulation), Blood, Arteries, Lungs, Pressure.

Data were obtained during two 14-day experiments in the USAF SAM two-man space cabin simulator relative to the physiologic factors in atmosphere selection. Both experiments were conducted at a simulated altitude of 27,000 feet (258 mm. Hg) and a PO2 of 243 mm. Hg. Emphasis was placed on arterial and alveolar PO2 and PCO2, chest x-rays, and vital capacity, all determined at the experimental altitude and atmosphere. The atmosphere, in general, was well tolerated by all 4 test subjects. No atelectasis was made evident by x-ray or by changes in vital capacity. Although vital capacity was reduced an average of 2.9%, this was not felt to be indicative of atelectasis. Arterial PO2 was slightly lowered but, again, it did not indicate a significant increase in the normal physiologic shunting of blood. (Author)

AD-430 544 Div. 16
OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROBLEMS OF CYBERNETICS IN MEDICINE,
by A. D. Voskresenskiy and A. I. Prokhorov.
17 Dec 63, 29p.
FTD TT63 521 Unclassified report

Trans. from Kibernetiku Na Sluzhbu Kommunizmu, Sbornik Statey Gosenergoizdat, Moskva-Leningrad, Vol. 1, pp. 126-140, 1961.

Descriptors: (*Cybernetics, Medical research), Physiology, Control systems, Dynamics, Theory, Cardiovascular system, Instrumentation, Computers, Data storage systems.

AD-430 559 Div. 16
OTS price $10.50

Chicago U., Ill.
(No title).
Quarterly progress rept. no. 50.
15 Jan 64, 13p.
Contract AF41 609 1693, Proj. 7757 02
Unclassified report

Original contains color plates: All DDC reproduction will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Radiation effects, Tissues (Biology)), (*Radioprotective agents, Chemical compounds), Toxicity, Histology, Pathology, Radiobiology, Radiological dosage, X rays, Biochemistry, Enzymes, Metabolism, Rats, Steroids, Survival, Effectiveness, Chemotherapeutic agents, Radiation injuries, Fast neutrons.

Contents: The Effects of Ionizing Radiations on the Biochemistry of Mammalian Tissues; Pharmacological and Toxicological Compounds as Protective or Therapeutic Agents Against Radiation Injury in Experimental Animals; and the Influence of Exposure to Low Levels of Gamma and Fast Neutron Irradiation on the Life Span of Animals.

AD-430 615 Div. 16
OTS price $3.60

Biochemical Lab., U. of Virginia, Charlottesville.
ELECTROPHORETIC AND PHOSPHATE ANALYSES OF HEMOLYSATES OF STORED BLOOD.
Final rept., 1 Apr 63-31 Mar 64,
by Alfred Chanutin. 31 Mar 66, 34p.
Grant DA MD49 193 63G93
Unclassified report

Descriptors: (*Blood, Electrophoresis), (*Electrophoresis, Blood), Erythrocytes, Analysis, Phosphates, Hemoglobin, Biochemistry, Storage, Statistical analysis.

Increases in pH or in ionic strength of the cacodylate buffer are responsible for a decrease in the concentration of a slow-moving boundary (Component B) in the electrophoretic pattern of human erythrocyte hemolysates. The patterns for crystalline hemoglobin, aged blood and phosphatase-treated hemolysates, all of which

contain trace amounts of organic phosphate and Component B, are almost identical. The addition of ATP, GTP, ITP or 2,3-DPG to crystalline hemoglobin or hemolysates of aged blood increases Component B concentration markedly, while ADP, GDP or IDP cause only moderate increases, and the mononucleotides have practically no effect. The organic phosphate concentrations of erythrocytes of ACD and CPD bloods, supplemented on 0 day with varying amounts of inosine, adenosine, adenine or mixtures of these compounds, show marked differences during anaerobic storage. Organic phosphate concentrations are maintained at the highest levels in CPD bloods supplemented with adenosine, adenosine + inosine, and adenosine + adenine. Statistical analysis shows a high degree of correlation between organic phosphate and Component B concentrations, but the slopes of the regression lines vary considerably. Both Component B and organic phosphate concentrations are maintained at appreciably higher levels during aerobic than during anaerobic storage of bloods. (Author)

AD-430 623 Div. 16
OTS price $1.10

Minnesota U., Minneapolis.
THORACIC CAGE IMPEDANCE MEASUREMENTS. DYNAMIC CHARACTERISTICS OF AN IMPEDANCE PNEUMOGRAPH,
by Edwin Kinnen, William Kubicek and G. Turton.
Dec 63, 9p.
Contract AF41 657 403, Task 775801
SAM TDR63 100 Unclassified report

Descriptors: (*Thorax, Tissue (Biology)), (*Respiration, Thorax), Physiology, Measurement, Motion, Medical equipment, Air, Volume.

An accurate calibration of an impedance pneumograph is complicated by two factors--tissue movement throughout the thorax during respiration and the mode of inspiration. In either case, the result is a variation in transthoracic electrical impedance which is not related to inspired air volume. It was found that the change of thoracic impedance as a function of inspired air volume for normal repeated inspirations had a variation of 50% at the 0.2-liter level of inspiration, decreasing to 10% at the 2-liter level. A significantly greater percent variation was noted for changes in the mode of subjects' breathing and between subjects. (Author)

AD-430 641 Div. 16
OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
THE EFFECT OF AGE AT EXPOSURE ON RADIATION-INDUCED POLYDIPSIA IN THE RAT,
by G. K. Osborn, D. C. Jones and D. J. Kimeldorf.
8 Jan 64, 27p.
Task MR005 08 5201 2
NRDL TR 712 Unclassified report

Descriptors: (*Radiation effects, Fast neutrons), Aging (Physiology), Rats, Thirst, Body weight, Food, Consumption, Physiology, Radiobiology, Whole body irradiation.

The effect of age at exposure to a single, sublethal dose of fast neutrons upon acute postirradiation changes in water and food consumption and body weight was studied in young (101 days) and old (619 days) rats. Food consumption (anorexia) and body weight (Loss) responses were similar for the two groups in time (days 1-4 postirradiation) and degree of occurrence. The typical biphasic polydipsia that is observed during the first five days after irradiation of young adult rats was not found in the older animals. Rather, the old rats showed a depressed water consumption with respect to both their own pre-irradiation level and the level of their non-irradiated controls, from the fourth to the eighth days. This depression did not appear to be related to a state of morbidity. (Author)

AD-430 642 Div. 16
OTS price $9.10

Army Chemical Research and Development Labs., Army Chemical Center, Md.
PROCEEDINGS OF CONFERENCE ON STUDIES OF THE EXTRACTIVES OF THE PLANT GENUS RYANIA,
by David L. Hill. Dec 63, 109p.
ACRDL SP2 53 Unclassified report

Descriptors: (*Insecticides, Biochemistry), (*Plants (Botany), Chemical properties), (*Symposia, Insecticides), Effectiveness, Toxicity, Aquatic animals, Physiology, Motor reactions, Muscles, Oxygen consumption, Cardiovascular system, Enzymes.

AD-430 662 Div. 16
OTS price $1.10

Oxford U. (Gt. Brit.).
BRAIN STEM STIMULATION AND ETHOLOGICAL STUDIES ON BIRDS.
Final technical rept. 1 Dec 62-31 Dec 63,
by N. Tinbergen, D. M. Vowles and J. D. Delius.
31 Dec 63, 7p.
Grant AF EOAR 62 22
AFOSR 641 0106 Unclassified report

Descriptors: (*Birds, Behavior), (*Ecology, Birds), Psychology, Brain, Stimulation, Reaction (Psychology), Sex.

This research was conducted to provide detailed descriptions of the birds' behavior and to analyse in greater detail the motivation of various behavioral systems, in order to provide a descriptive and motivational basis by which the behavior of birds in the wild may be compared with that obtained by stimulation techniques. A number of behavioral systems - territorial behavior, pair-bond formation and maintenance, copulation, nest-building, incubation, grooming the body surface and bathing were examined. Preliminary analysis suggests that care of the body surface is motivated by two, probably independent, systems: preening and 'comfort'. It has been shown that preening is controlled by a combination of postural facilitation and local external stimulation. Some interesting differences have been demonstrated between the preening behavior of 'normal' and incubating birds, and these seem to conflict with van Iersel and Bol's hypothesis of the motivation of so-called 'displacement' activities. (Author)

AD-430 720 Div. 16
OTS price $1.10

National Taiwan Univ. (China).
A STUDY OF ANTIGENIC ACTIVITY OF SOME PLANT TOXALBUMINS.
Annual progress rept., 1 Feb 63-31 Jan 64,
by Yun-Tao Sun. 7p.
Grant DA MD49 193 63G100
Unclassified report

Descriptors: (*Plants (Botany), Toxins & antitoxins), (*Toxins & antitoxins, Plants (Botany), Ricin, Toxicity, Chemical properties, Immunology, Biochemistry, Mice, Rabbits.

Ricin, the highly toxic hemagglutinating protein, was isolated from the seeds of Ricinus Communis

L.. The defatted castor meal firstly extracted with 10% sodium chloride Solution, followed by fractional precipitation with ammounium Sulfate, the highly toxic ricin fractions I and II were obtained. Ricin I was the most toxic fraction, killing the mouse of 20 Gm. at a dose of 1 mcg. by intraperitoneal injection of 4 days. The qualitative determination of Ricin fractions was by paper chromatographic method. Digestion of Ricin I by pepsin and trypsin was found to take place slowly in 3 days. A prolonged enzymatic digestion was made for 2 weeks, it broke down about 39-48% of low molecular products. Antitoxic serum to Ricin I was prepared by immunization of rabbits with an increasing amount of formalinized toxoid (formalin treated Ricin I). The concentration of 0.5-5% formalin were used resulting about a 100-1000 fold reduction in toxicity of Ricin I. Marked loss of antifenicity occured with formalin at pH 8.5 and above. (Author)

AD-430 795 Div. 16
OTS price $1.60

Kyoto U., Japan.
STUDIES ON THE NATURE OF THE GENETIC MATERIAL TRANSFERRED DURING CONJUGATION IN ESCHERICHIA COLI.
Final rept. 20 Apr 62-19 Apr 63,
by Takashi Yura. 19 Apr 63, 18p.
Contract DA92 557 FEC35949
Unclassified report

Descriptors: (*Enzymes, Biosynthesis), (*Genetics, Escherichia), Biochemistry, Bacterial extracts, Molecular properties, Sex, Cells (Biology), Membranes (Biology), Surface properties, Metabolism.

Evidence suggests that cell walls are capable of specifically interacting with cells of opposite mating types and that these interaction are responsible for the observed inhibition of genetic conjugation. Futhermore, it is shown that cell walls of male or female bacteria contain a specific mating substance or substances. This represents the first evidence for the presence of a female specific substance. The cell-free information of the tryptophan synthetase was studied both from genetic and biochemical viewpoints. Crude extracts obtained from partially derepressed wild-type cells are able to form the enzyme under certain conditions. It was found that two distinct mechanisms exist, one of them being a partially DNA-dependent system while the other represents the activation-and-release of the enzyme from ribosomes. The latter mechanism seems to be one of the steps involved in the activity increase in the former system. Results of the detailed studies on the nature of these two systems are presented. (Author)

AD-430 848 Div. 16, 1, 12
OTS price $9.60

Aerospace Corp., Los Angeles, Calif.
MANNED ORBITING STATION AND ALTERNATIVES.
VOLUME III.
10 Oct 63, 118p.
Unclassified report

Descriptors: (*Space stations, Biology), (*Astronautics, Biology), Performance (Human), Space environmental conditions, Space medicine, Stress (Physiology), Tolerances (Psysiology), Radiation hazards, Vibration, Acceleration, Carbon dioxide, Human engineering, Protective clothing, Feasibility studies, Research program administration, Weightlessness, Gamma rays, Solar flares, Solar radiation, Radio biology.

Briefing outlines are presented concerning a Bioastronautic Technical Analysis of the Military Manned Space Flight Missions. The following subjects are included: (1) Biomedical Investigations, (2) Biotechnological Developments and Tests, (3) Radiobiological Research and Testing, as well as (4) Human Performance and Psychophysiology. (Author)

AD-430 874 Div. 16
OTS price $3.60

University Coll. of East Africa, Kampala (Uganda).
PROFESSIONAL ACTIVITIES OF THE UNITED STATES MEDICAL RESEARCH AND DEVELOPMENT COMMAND PROJECT.
Annual progress rept., 1 Jan-31 Dec 63,
by Daniel H. Connor, Norman E. Wilks and George R. Barnley. 31 Dec 63, 31p.
Grant DA MD49 193 62G56
Unclassified report

Descriptors: (*Parasites, Infections), (*Disease vectors, Ecology), (*Infections, Pathology), Worms, Communicable diseases, Hemosporidia, Blood, Medical examinations, Excretion.

During the year under review work has proceeded in several areas of research selected from a number of previous pilot studies. Investigations were conducted concerning the life cycle of O. volvulus in the vector, S. neavei and the distribution and pathology of onchocerciasis in Uganda. Field and laboratory studies of the epidemiology of Buruli ulcer were accomplished. The role of Plasmodium malariae in Big Spleen Disease and nephrotic syndrome was investigated, as was the incidence of malaria and the effects of the infection in patients with SS hemoglobin. Malaria as a cause of abortions was also studied. Information was acquired regarding the significance of hookworm egg counts in anemias and the appearance of occult blood in the feces. The incidence and pathology of other parasitic infections were investigated. Considerable progress was made in the study of the obscure heart disease, endomyocardial fibrosis. Surveys and material referred to the unit for consultation have provided additional data and bases for possible future research into a variety of other disease conditions. (Author)

AD-430 904 Div. 16
OTS price $9.60

Vanderbilt U., School of Medicine, Nashville, Tenn.
PROCEEDINGS OF A CONFERENCE ON FAT EMULSION FOR INTRAVENOUS NUTRITION, OCTOBER 8-9, 1963, VANDERBILT UNIVERSITY, SCHOOL OF MEDICINE, NASHVILLE, TENNESSEE,
by H. C. Meng. Oct 63, 120p.
Unclassified report

Descriptors: (*Nutrition, Symposia), Fats, Injection (Medicine), Toxicity, Test methods, Veins, Safety, Man, Hematology, Liver, Morphology (Biology), Blood, Lipids, Blood circulation.

AD-430 907 Div. 16
OTS price $10.50

Western Reserve U. School of Medicine, Cleveland, Ohio.
STUDIES OF THE IMMUNOLOGICAL FACTORS INVOLVED IN HOMOLOGOUS TISSUE TRANSPLANTATION.
Annual progress rept., 1 Mar 63-29 Feb 64,
by Charles A. Hubay. 29 Feb 64, 137p.
Contract DA49 007md961
Unclassified report

Descriptors: (*Immunology, Transplantation), (*Transplantation, Immunology), (*Transplantation, Tissues (Biology)), Blood groups, Antigens & antibodies, Skin, Sensitivity, Spleen, Glucose, Lymphatic system, Tissue culture, Microsomes, Gamma globulin, Laboratory animals, Rodents.

Studies of the association between blood groups and tissue compatibility in the rabbit revealed that antigens controlled by the Hg locus have a significant role in skin graft homograft survival time. A detailed analysis of the problem of chance homogeneity and survival of human homograf transfers is presented. An in vitro assay system is described which can monitor the effects upon antigen-containing bone marrow cells of various sera, lymph node cells and cell-free derivatives of lymph node cells. A cell-free preparation (PTF) from lymph nodes of guinea pigs hypersensitive to chicken egg albumin or bovine gamma globulin was injected into normal animals. Studies were made on the purification of guinea pig transfer factor (PTF). Studies have been made on the subcellular composition of guinea pig lymph node. Various chemical and enzymatic criteria have been employed to define the subcellular fractions obtained by differential ultracentrifugation. (Author)

AD-430 921 Div. 16
OTS price $3.60

Baylor U., Coll. of Medicine, Houston, Tex.
AUTOMATIC GSR ANALYZER,
by Neil R. Burch, Harold E. Childers and Robert J. Edwards, Jr. Nov 63, 36p.
Contract AF41 609 1527, Task 775102
SAM TDR63 74 Unclassified report

Descriptors: (*Galvanic skin response, Analysis), (*Galvanic skin response, Instrumentation), Automatic, Recording systems.

To extend the studies of GSR activity, an automatic analyzer was designed and a prototype system was built and tested. The analyzer measures the sum of onset-to-peak amplitudes, sum of the onset-to-peak times, and the number of GSR's per epoch. The analyzer reduces the data at a rate equal to generation of the GSR activity, and it is expected that faster than real time analysis can be accomplished with a tape recording system and some modification of the analyzer. With the automatic analyzer, studies can be carried out with immediate data reduction which should aid in defining the relations between the parameters of GSR activity and the level of arousal in psychophysiologic studies.(Author)

AD-430 951 Div. 16
OTS price $8.10

Old Dominion Coll., Norfolk, Va.
THE ECOLOGY OF TICKS TRANSMITTING ROCKY MOUNTAIN SPOTTED FEVER IN THE EASTERN UNITED STATES.
Annual progress rept., 1 June 63-31 Jan 64,
by Daniel E. Sonenshine. 24 Feb 64, 87p.
Contract DA49 193MD2439
Unclassified report

Descriptors: (*Ecology, Ticks), (*Ticks, Ecology), Disease vectors, Rickettsia, Behavior, Reproduction (Physiology), Humidity, Distribution, Climatology, Temperature.

Field and laboratory studies pertaining to the ecology of Dermacentor variabilis (primarily) in relation to transmission of Rocky Mountain spotted fever are reported. Isolation of Rickettsia rickettsii was made from 18 of 36 tick pools collected at a 40 acre study area. A vegetative survey of the study area was done to determine the extent of correlations between the distribution of infectious foci, tick distribution, and other related phenomena. Correlative analyses are in progress. The total adult Dermacentor variabilis population was measured with a mark and recapture technique; distribution, migration, and other aspects of the ecology of this species are also reported. Laboratory studies on behavior were initiated with temperature controlled systems to provide humidity gradients. Unfed nymphs exhibited a strong tendency to remain in humid areas. Oviposition, hatching, and longevity at different relative humidities were measured. Oviposition was largely independent of humidity, but hatching was greatly reduced at humidities below 65%; survival was also greatly curtailed at lower humidities. Studies on the dynamics of feeding in D. variabilis are also reported. (Author)

AD-430 952 Div. 16
OTS price $1.10

Naval Medical Field Research Lab., Camp LeJeune, N. C.
CORONARY HEART DISEASE DETECTION. PRELIMINARY REPORT: REVIEW AND PROGRESS IN STUDIES OF HUMAN CONSTITUTION AND EPIDEMIOLOGY OF CORONARY ATHEROSCLEROSIS,
by George L. Calvy and Menard M. Gertler. Feb 64, 5p.
Unclassified report

Descriptors: (*Heart, Diseases), (*Diseases, Epidermiology), (*Atherosclerosis, Epidemiology), Medicine, Therapy, Determination, Medical research.

AD-430 953 Div. 16
OTS price $8.10

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
BINAURAL INTERACTION IN THE ACCESSORY SUPERIOR OLIVARY NUCLEUS OF THE CAT - AN ELECTROPHYSIOLOGICAL STUDY OF SINGLE NEURONS,
by Joseph L. Hall, II. 22 Jan 64, 88p. Technical rept. no. 416
Contract DA36 039sc78108, Grant DA SIG36 039 61 G14, Task 3 99 25 001 08
Unclassified report

Doctoral thesis.

Descriptors: (*Nerve cells, Electric potential), (*Stimulation, Auditory nerve), (*Audiometry, Models (Simulations), Sensory mechanisms, Psychology, Perception, Hearing, Mathematical models, Brain, Cats, Bionics, Thresholds (Physiology), Reaction (Psychology).

In an effort to understand the neural encoding of binaurally presented stimuli, clicks were presented through earphones to the two ears of Dialanesthetized cats. The electrical response activity of single nerve cells in the accessory nucleus of the superior olive was studied. Stimulus parameters investigated include interaural time difference, interaural intensity difference, and average intensity. Attention was focused on cells that were excited by stimulation of the contralateral ear and inhibited by stimulation of the ipsilateral ear. (Author)

AD-431 026 Div. 16, 12
OTS price $8.10

MRD Div., General American Transportation Corp., Niles, Ill.
INTERNAL ENVIRONMENTAL SIMULATOR FOR A MAN-MACHINE SYSTEM.

Final rept., Nov 59-July 61,
by J. D. Zeff, T. R. Charanian, D. A. Davidson, R. B. Neveril and C. M. Tomsic. Sep 63, 83p.
Contract N61339 786, Proj. 0 41111
NTDC 786 2 Unclassified report

Descriptors: (*Life support, Models (Simulations)), (*Water, Recovery), (*Oxygen, Regeneration), (*Spacecraft cabins, Air conditioning equipment), Analysis, Maintenance, Control, Military requirements, Operation, Test methods, Instrumentation, Gases, Temperature, Humidity, Physiology, Carbon dioxide, Closed ecological systems, Design.

Control, maintenance, repair and performance requirements for advanced life-support systems were investigated by laboratory evaluations of experimental water recovery, oxygen regeneration, and cabin gas conditioning models. This report: (1) reviews the design criteria (established in the preceeding Study Phase Report), (2) describes the system operation and test procedures, (3) discusses the test results, and (4) lists recommendations for an advanced, integrated life-support system. The three models were designed to support the physiological requirements for water, oxygen, and environmental control in a closed compartment containing a three-man crew on a two-week mission through a hostile external environment. (Author)

AD-431 027 Div. 16
OTS price $2.60

American Electronic Labs., Inc., Philadelphia, Pa.
A STUDY AND INVESTIGATION OF INSTRUMENTATION FOR ECOLOGICAL MONITORING.
Final rept.,
by W. H. Stark and J. S. Leigh. Nov 63, 30p.
Contract Nonr283500
Unclassified report

Report on Modulation and Information Retrieval Utilizing Animal Telemetry Transmitters.

Descriptors: (*Ecology, Instrumentation), (*Ecology, Monitors), (*Behavior, Laboratory animals), (*Telemetering transmitters, Animals), Information retrieval, Telemeter systems, Radio beacons, Modulation, Telemetering data, Acoustics, Temperature, Frequency, Birds, Fishes, Voice communication systems.

The study and investigation of modulation and of information retrieval has been conducted in respect to techniques and devices for the acquisition of data from animals and their environments. Such data will be valuable in the study of the special behavior characteristics of certain animals in respect to their environment. The program encompassed the total problem of sensing and telemetry. Telemetry is the transfer of information t the receiving location. Miniaturization and weight of instrumentation were important considerations in the investigation. Experimental circuits and devices were designed and constructed to aid in the practical study and evaluation of techniques and devices, which would be compatible with the needs of miniaturized instrumentation. Circuits for these test models have also been made a part of this report. An appendix is included which describes the instrumentation developments that are related to this phase of the contract. The development of a small lightweight radio beacon for birds is described, and a tone modulation system for this unit is discussed. The development of a deep-water, submersible, aquatic transmitter is also described. (Author)

AD-431 111 Div. 16
OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
EVALUATION OF PROPHYLAXIS PASTES AND TROPICAL APPLICATIONS PREPARED WITH X-14 STANNOUS FLUORIDE SOLUTION,
by Ira L. Shannon. Dec 63, 11p.
Task 775602
SAM B TDR63 103 Unclassified report

Descriptors: (*Protective treatment, Teeth), (*Fluorides, Dentistry), (*Dentistry, Protective treatment), Preparation, Effectiveness.

A stock solution of stannous fluoride was aged over a period of 8 weeks and tested at intervals as a base solution for the preparation of 10% stannous fluoride topical solution and, when added to silex, as a component of a prophylaxis paste. The compatibility of this solution was tested with four pumice and with silex in fully prepared prophylaxis pastes. The pumice contained approximately 7.0% stannous fluoride; the silex paste, about 3.7%. Performance of the test preparations was based upon the amounts of phosphorous withdrawn from enamel surfaces by 0.025 M lactic acid both before and after the test treatment. Protection afforded by the 10% stannous fluoride topical application ranged from 68.3 to 78.8%. Silex prophylaxis paste prepared from aging stock solution provided protection of from 68.2 to 79.1%. The flour pumice paste, aged as mixed, was 71.6 to 82.8% effective, while a comparable silex paste reduced enamel solubility by 67.9 to 76.9%. There was no apparent deleterious effect of age on any of the preparations tested. (Author)

17. METALLURGY

AD-429 428 Div. 17, 27
OTS price $7.60

Stanford Research Inst., Menlo Park, Calif.
TUNGSTEN AND ROCKET MOTORS.
Final rept.,
by G. M. Gordon and D. A. Brown. 31 Dec 63, 63p.
Contract NOrd18619FBM, SRI Proj. PMU2785
Unclassified report

Descriptors: (*Rocket motors, Tungsten), (*Tungsten, Rocket motors), Erosion, Shock resistance, Thermal stresses, Combustion products, Chemical reactions, Exhaust gases, Hydrogen, Nitrogen, Hydrogen compounds, Chlorides, Carbon dioxide, Carbon compounds, Monoxides, Water vapor, Aluminum compounds, Oxides, Rocket motor nozzles, Porous metals, Impregnation, Silver, Porosity, Ductility, Brittleness, Transition temperature, Recrystallization, Copper, Thickness.

The erosion and thermal shock characteristics of tungsten were studied under conditions that simulated the exhaust of an aluminized rocket propellant. The erosion research consisted of two phases: a static chemical reaction study, and a dynamic erosion study employing a plasma torch. The thermal shock study employed a specially constructed test apparatus (using hollow cylindrical specimens) to experimentally characterize the relative resistance of various types of tungsten. Of the materials studied, silver- and copper-infiltrated tungsten were found to have the best thermal shock resistance, and 80% dense pressed and sintered tungsten the poorest. Two thermal shock sensitivity parameters were developed to allow direct calculation of relative shock resistance from materials property data. The effects of specimen size, and of metallurgical and environmental parameters were also investigated. (Author)

AD-429 446 Div. 17, 31
OTS price $3.60

United States Steel Corp., Monroeville, Pa.
EFFECT OF COLD FORMING ON THE FATIGUE PROPERTIES OF HY-80 STEEL PLATES,
by R. P. Haak and S. T. Rolfe. 2 Jan 64, 1v.
Contract Nobs88540, Projs. 40 18 003 4, SR007 01 01, Task 853
Unclassified report

Descriptors: (*Submarine hulls, Steel), (*Steel, Cold working), Metal plates, Ship plates, Material forming, Fatigue (Mechanics), Mechanical properties, Deformation, Heat treatment, Aging (Materials), Stresses.

This report describes the results of a limited investigation to determine the effects of cold deformation and subsequent stress relieving or aging on the rotating-beam fatigue properties of HY-80 steel. The tests were run to determine whether sufficient variation in the low-cycle fatigue lives existed to warrant an extensive investigation of the effects of cold forming on the fatigue properties of HY-80 steel. The results indicated that no large changes took place in the rotating-beam fatigue lives of specimens that had been previously cold-deformed in tension or compression or of specimens that had been cold-deformed and subsequently stress-relieved or aged, especially when compared with expected changes in fatigue life resulting from notches, flaws, etc. (Author)

AD-429 447 Div. 17, 31
OTS price $2.60

United States Steel Corp., Monroeville, Pa.
PRODUCTION AND PROPERTIES OF 5NI-CR-MO-V STEEL PLATES,
by S. J. Manganello, L. F. Porter and G. E. Loveday. 2 Jan 64, 1v.
Contract NObs88540, Proj. 40 18 001 16, SR007 01 01, Task 853
Unclassified report

Descriptors: (*Submarine hulls, Steel), (*Steel, Material forming), Melting, Casting, Rare earths, Rolling (Metallurgy), Mechanical properties, Nickel alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys, Heat treatment, Quenching (Cooling), Tensile properties, Toughness, Microstructure, Chemical analysis.

An 80-ton, basic-electric-furnace, five-ingot heat of a 5Ni-Cr-Mo-V steel considered promising as an HY-130/150 steel was produced to provide material for evaluation of its suitability as an HY-130/150 weldment and to provide material to the Marine Engineering Laboratory for an evaluation of the effect of the addition of rare earths on the properties of a submarine-hull-type steel having a minimum yield strength of 140 ksi. The results of the production and properties of the 5Ni-Cr-Mo-V steel are summarized. (Author)

AD-429 448 Div. 17, 26, 31
OTS price $2.60

United States Steel Corp., Monroeville, Pa.
PROPOSED STRUCTURAL EVALUATION OF HY--130/150 AND HY-180/210 STEELS AND WELDMENTS,
by S. T. Rolfe. 2 Jan 64, 20p.
Contract NObs88540, Proj. 40 18 001 15, SR007 01 01, Task 853
Unclassified report

Descriptors: (*Submarine hulls, Steel), (*Steel, Test methods), Welds, Metal plates, Ship plates, Welding rods, Welding, Mechanical properties, Material forming, Fatigue (Mechanics), Fracture (Mechanics), Corrosion.

This report describes the types of tests, number of specimens, and test conditions to be used in the evaluation of all laboratory heats, most promising laboratory heats, and production heats in the areas of strength and formability, fracture, fatigue, base-metal weldability, and corrosion. The tests described are primarily laboratory screening tests, and prior to the use of either an HY-130/150 or an HY-180/210 weldment in submarine-hull construction, additional large-scale testing should be undertaken. (Author)

AD-429 754 Div. 17
OTS price $1.60

Metals and Controls Inc., Attleboro, Mass.
STUDY OF DUCTILE COATINGS FOR THE OXIDATION PROTECTION OF COLUMBIUM & MOLYBDENUM ALLOYS.
Bimonthly progress rept. no. 3, 1 Nov-31 Dec 63. 31 Jan 64, 11p.
Contract N0w63 0706c
Unclassified report

Descriptors: (*Metal coatings, Heat-resistant metals and alloys), (*Oxidation, High-temperature research), Molybdenum alloys, Niobium alloys, Titanium alloys, Zirconium alloys, Tantalum alloys, Tungsten alloys, Coatings, Platinum, Platinum alloys, Rhodium alloys, Ductility, Diffusion, Interference, Boron

compounds, Nitrides, Aluminum compounds, Oxides, Aluminum, Gold, Rhenium, Welds, Porosity, Failure (Mechanics), Grain structure (Metallurgy), Metallography, Cladding.

Additional oxidation tests were performed on platinum and platinum-10% rhodium alloy at temperatures up to 1525 C. The effect of air flow rate was studied at 1200 C (2200 F) and 1400 C (2550 F). Also, the rate of oxidation of platinum at 1525 C (2800 F) was determined in an air flow of 24 ipm. Binary composites of platinum on columbium and molybdenum were prepared and tested. The methods used in sample preparation did not provide sufficient edge protection and several new methods are being considered. Methods were selected for preparation of coating-diffusion barrier - base metal composites. An attempt was made to form an alumina diffusion barrier on FS-85 alloy through the reaction of aluminum foil with oxide on the surface of the alloy. The film formed was not satisfactory. (Author)

AD-429 800 Div. 17
OTS price $.75

Ghent U. (Belgium).
LOW-STRESS BRITTLE FRACTURE IN MILD STEEL.
Special rept.,
by R. Dechaene, W. Soete and A. Vinckier.
30 Aug 63, 18p. PB181547
SSC 158 Unclassified report

Descriptors: (*Steel, Fracture (Mechanics)), (*Brittleness, Steel), Metal plates, Welds, Stresses, Temperature, Strain (Mechanics), Plasticity, Loading (Mechanics), Photographic analysis, Deformation, Thermal stresses, Thermal expansion, Ductility, Test methods.

AD-429 911 Div. 17, 25
OTS price $.75

General Dynamics, Fort Worth, Tex.
PROCESSING - HYDROGEN EMBRITTLEMENT OF CADMIUM PLATED, ARTC PROJECT 6-61, NOTCH TENSILE SPECIMENS - SUSTAINED LOAD TESTING OF,
by W. M. Pratt and R. L. Jones. 13 Sep 62, 19p.
Rept. no. ERR FW161
Contract AF33 657 11214
Unclassified report

Descriptors: (*Steel, Hydrogen embrittlement), (*Plating, Cadmium), Tensile properties, Test methods, Stresses, Loading (Mechanics).

AD-429 913 Div. 17
OTS price $3.60

General Dynamics, Fort Worth, Tex.
MATERIAL - BRAZED STAINLESS STEEL SANDWICH - EXPOSURE TO WEATHERING UNDER SEASHORE CONDITIONS - EFFECT ON,
by W. F. Heidbrier. 8 May 62, 32p. Rept. no. FGT2948
Contract AF33 600 41891
Unclassified report

Descriptors: (*Sandwich panels, Environmental tests), (*Honeycomb cores, Environmental tests), (*Stainless steel, Sandwich panels), Brazing, Silver solders, Corrosion resistant alloys, Corrosion, Failure (Mechanics), Shear stresses, Silver alloys, Manganese alloys, Copper alloys, Lithium alloys, Jet bombers.

Four brazed stainless steel honeycomb sandwich panels first tested for structural integrity and installed at an exposure site. The condition of the panels was periodically checked by flash-testing. One panel, having silver-manganese brazing alloy failed the flash test after 9 months exposure. Two other silver-manganese brazed panels failed the flash test after 17 months exposure. The remaining panel, having silver-copper-lithium brazing alloy, was returned intact after 38 months exposure. It was subsequently flash-tested, without failure, and then structurally tested in torsional shear to an ultimate failing stress of 77,000 psi. (calc.). This test demonstrated the superior corrosion-resistance qualities of Ag-Cu-Li brazing alloy for 17-7 PH stainless steel sandwich panels. (Author)

AD-429 914 Div. 17, 1
OTS price $2.60

General Dynamics, Fort Worth, Tex.
FUSELAGE TORSIONAL TEST OF ALUMINUM ALLOY MONOCOQUE CYLINDERS.
15 Jan 64, 18p. Rept. no. FTDM2879
Contract AF33 657 11214
Unclassified report

Descriptors: (*Aluminum alloys, Cylindrical bodies), (*Cylindrical bodies, Monocoques), (*Monocoques, Aluminum bodies), Strain gages, Structural shells, Tensile properties, Buckling (Mechanics), Shear stresses, Torque, Failure (Mechanics), Tables.

Torsional buckling strength for thin walled monocoque cylinders of varying skin gages at a temperature of 260 F was determined. The effect of a heat rise rate of 6 F/sec. on the test specimens was required. Strain gage and tensile coupon data are presented. Heat rise rates up to 10.3 F/sec were measured with no detrimental effect on test specimens. All test specimens failed by shear buckling with 45 degree shear wrinkles developing in the skin over the 20 inch bay. (Author)

AD-429 922 Div. 17, 14
OTS price $5.60

General Dynamics, Fort Worth, Tex.
REFRACTORY METAL BRAZED SANDWICH DEVELOPMENT AND TESTING,
by W. T. Kaarlela. 28 Dec 62, 55p. Rept. no. ERR FW188
Contract AF33 657 11214
Unclassified report

Descriptors: (*Refractory metals & alloys, Brazing), (*Sandwich panels, Refractory metals & alloys), Bonding, Diffusion, Controlled atmospheres, Argon, Electric insulation, Thermal insulation, Heating elements, Compressive properties, High-temperature research.

A new method of brazing in the 2000 to 3000 F temperature range referred to as the Con-Rad Process, was developed. Using this process, several 1 x 1, 6 x 6, and 12 in. x 12 in. brazed niobium alloy and diffusion bonded titanium sandwich panels were produced. Three of the brazed niobium alloy panels were cut into smaller test specimens. Room temperature and 2000 F edge compression tests indicated 100% braze joint efficiency. The elevated temperature use of such structure will be limited by the strength of the skin material, and not by the strength of the braze. (Author)

AD-429 925 Div. 17
OTS price $2.60

Honeywell Research Center, Hopkins, Minn.
THE NOTCH IMPACT BEHAVIOR OF TUNGSTEN,
by R. J. Stokes and C. H. Li. Dec 63, 23p.
TR22
Contract Nonr407600, Proj. NR032 451
Unclassified report

Descriptors: (*Tungsten, Fracture (Mechanics)), (*Fracture (Mechanics), Tungsten), Recrystallization, Heat treatment, Grain structures (Metallurgy), Grain boundaries, Ductility, Brittleness, Transition temperature, Toughness, Fractography, Electron microscopy, Microstructure, Cold working, Powder metallurgy.

This paper compare the fracture behavior of tungsten rods in three conditions, recrystallized, recovered, and wrought. Notched specimens subjected to a 50 in. lb. impact load showed ductile brittle transitions at 700 C, 490 C, and 440 C respectively. The recrystallized material had an equiaxed grain structure and fractured by simple cleavage from a grain boundary source at all temperatures up to 700 C. The wrought and recovered material had an elongated fiberous structure and at low temperatures fractured by cleavage originating from the notch. As the transition temperatures was approached cleavage was preceded by more and more intergranular splitting which deflected the crack front into planes parallel to the tensile axis. The enhanced toughness of wrought and recovered tungsten was attributed both to its inability to initiate cleavage because no grain boundaries were suitably oriented perpendicular to the tensile stress and its inability to maintain cleavage because of intergranular splitting ahead of the crack. (Author)

AD-429 932 Div. 17
OTS price $1.60

AiResearch Mfg. Co., Phoenix, Ariz.
MATERIALS INVESTIGATION, SPUR PROGRAM. PART IV. FATIGUE EVALUATION OF Cb + 1 W/O Zr.
Report for Nov 60-Aug 63,
by R. Salley and E. Kovacevich. Feb 64, 17p.
Contract AF33 657 8954, Proj. 3145, Task 314511

18ASD TDR63 270, pt. 4 Unclassified report

Report on Dynamic Energy Conversion.

Descriptors: (*Niobium alloys, Fatigue (Mechanics)), (*Fatigue (Mechanics), Liquid metals), Liquid metal cooled reactors, Alkali metals, Lithium, Potassium, Test equipment, Zirconium alloys, High-temperature research.

The results of experimental investigations to evaluate the cantilever fatigue propertzes of Nb + 1 wt.-% Zr are presented in this report. Tests were conducted with specimens in 800 F liquid potassium and in 1600 F liquid lithium to determine what effect, if any, these alkali metals would have on the fatigue properties of this alloy. The tests resulted in no serious contamination of the test material, and endurance limits for the test conditions were established. (Author)

AD-429 962 Div. 17
OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
STUDYING THE OXIDATION OF NIOBIUM BASE ALLOYS,
by V. I. Grigorovich and A. I. Dedyurin.
10 Jan 64, 37p.
FTD TT63 1020 Unclassified report

Trans. from Trudy Instituta Metallurgii, Metallurgiya Metallovedeniye Fiziko Khimicheskiye Metody Issledovaniya (Russian), Izdatel'stvo Akademii Nauk SSSR, no. 12, pp. 214-240, 1963.

Descriptors: (*Niobium alloys, Oxidation), (*Oxygen, Diffusion), Reaction kinetics, Additives, Zirconium alloys, Chromium, Molybdenum, Titanium, Vanadium, Air, High-temperature reasarch.

AD-430 003 Div. 17, 26
OTS price $6.60

Westinghouse Electric Corp., Blairsville, Pa.
PROCESSING AND EVALUATION OF PRE-PRODUCTION QUANTITIES OF COLUMBIUM ALLOY SHEET.
Final rept., 24 Jan 63-15 Jan 64,
by R. A. Nadler. 20 Jan 64, 62p.
Contract N600 19 59546
Unclassified report

Descriptors: (*Niobium alloys, Materials forming), (*Sheets, Niobium alloys), Molybdenum alloys, Tantalum alloys, Tungsten alloys, Vanadium alloys, Zirconium alloys, Extrusion, Forging, Rolling (Metallurgy), Heat treatment, Cold working, Hot working, Recrystallization, Microstructure, Chemical analysis, Tensile properties, High-temperature research, Stresses, Rupture, Welds, Ductility, Brittleness, Transition temperature.

Single 300-lb, 6-in. ingots of FS-85 (Nb-27Ta-10W-1Zr) and B-66 (Nb-5Mo-5V-1Zr) were converted to 0.050-by 18-in.-wide sheet and evaluated with respect to mechanical properties and weldability. FS-85 was judged to be the more fabricable alloy and this was attributed to its lower strength. The quality of the sheet produced was equivalent for the two alloys except that better flatness was achieved for FS-85. The tensile strength and stress-rupture behavior of B-66 was superior to that of FS-85 up to 2400F. Base metal bendability was less than 1T for both alloys. FS-85 had a 4T bend transition temperature of -250F as compared to -100F for B-66. The as-welded ductility of FS-85 was superior to that of B-66. (Author)

AD-430 011 Div. 17, 25
OTS price $2.25

Illinois U., Urbana.
CYCLE DEPENDENT DEFORMATION BEHAVIOR OF CLOSE-PACKED METALS.
Rept. for 1 Apr 61-July 63,
by C. E. Feltner. Nov 63, 90p.
Contract AF33 616 8177, Proj. 1 80 735, Task 73521
RTD TDR63 4149 Unclassified report

Report on Deformation and Fracture of Crystalline Solids under Dynamic loading.

Descriptors: (*Metals, Deformation), (*Low temperature research, Metallic crystals), Cryogenics, Aluminum, Cadmium, Copper, Crystal structure, Creep, Fatigue (Mechanics), Stresses, Strain (Mechanics), Statics, Dynamics, Crystal lattice defects, Electron microscopy, Theory, Analysis, Test methods, Test equipment, Bibliography.

Deformation effects associated with combined creep and fatigue loading are investigated for

several metals over a range of homologous temperatures. Three fundamentally different but related sets of experiments are included. The phenomenon of cyclic stress induced creep is investigated for copper, aluminum and cadmium at room temperature and 78K. For combined creep and fatigue, a clear delineation is established between deformation processes which are time-dependent and those which are cycle-dependent. Transmission electron microscopy is used to study the dislocation arrangements formed in aluminum at 78K by the action of repeated tensile stresses. Finally a study is made of the low temperature yield point effect in fcc metals and its enhancement by cyclic straining. Combined with an interpretation and critical analysis of the current experimental and theoretical situation, the results and conclusions of the three experimental programs are used to define the necessary constituents of dislocation models which are applicable to cycle-dependent deformation problems. (Author)

AD-430 037 Div. 17
OTS price $2.67

Technische Hochschule, Vienna (Austria).
THE PREPARATION OF RARE EARTH-MANGANESE-MERCURY ALLOYS,
by F. Lihl. 31 Jan 63, 25p. Technical note no. 3
Contract 61 052 609
Unclassified report

Descriptors: (*Rare earth elements, Alloys), (*Manganese alloys, Preparation), (*Mercury alloys, Preparation), Gadolinium alloys, Samarium, Mercury, Manganese, Gadolinium, Solvent action, Evaporation, Solutions, Pyrolysis.

A method is described which allows by means of mercury to prepare RE-Manganese alloys, which are in an equilibrium state at 300 to 500 C. The process consists of 4 steps, namely (1) preparation of RE-amalgams by solving the metal in mercury at 450 C, (2) preparation of Manganese-amalgam by electrolysis, (3) reaction between RE-metal, Manganese and mercury, and (4) evaporation of the mercury. The process has been used for the preparation of Samarium- or Gadolinium-Manganese alloys, but it is applicable to all RE-metals and numerous other metals besides manganese. (Author)

AD-430 082 Div. 17
OTS price $.75

Defense Metals Information Center, Columbus, Ohio.
A DISCUSSION OF THE PHYSICAL METALLURGY OF THE 18 PER CENT NICKEL MARAGING STEELS,
by A. M. Hall. 15 Nov 63, 18p. Rept. no. 194
Contract AF33 615 1121, Proj, 8975
Unclassified report

Descriptors: (*Steel, Hardening); (*Metallurgy, Steel), Austenite, Martensite, Aging (Materials), Nickel alloys, Dispersion hardening, Heat treatment, Transformations.

Various aspects of the physical metallurgy of the 18 % nickel maraging steels are discussed in this report in the light of the knowledge which has thus far been accumulated on these steels. The 18 % nickel type of maraging steel was singled out for discussion because of its especially attractive combination of strength and fracture toughness, the comparative simplicity with which it can be hardened, and the relative ease with which it can be formed and joined. The high-nickel maraging steels are considered to be outstanding members of a loose-knit family of age-hardenable or precipitation-hardenable martensitic steels. Some comparisons and analogies are drawn among various members of this family with particular reference to the 18% nickel steels. (Author)

AD-430 096 Div. 17
OTS price $2.60

Denver Research Inst., Colo.
RESEARCH ON THE SAMARIUM-TYPE INTERMEDIATE PHASES OF INTRA-RARE-EARTH BINARY SYSTEMS.
Technical rept. no. 2, 1 Jan-31 Dec 63,
by C. E. Lundin and J. F. Nachman. Jan 64, 26p.
Rept. no. 2141
Contract Nonr3661 02 .
Unclassified report

Descriptors: (*Rare earth elements, Alloys), Cerium alloys, Gadolinium alloys, Holmium, Lanthanum, Neodymium alloys, Metallography, X-ray diffraction analysis, Phase studies, Photomicrography, Hardness, Density, Instrumentation, Transition temperature, Crystal structure, Crystal lattices.

Five new binary intra-rare-earth systems were investigated to confirm the existence of the samarium-type intermediate phase. These systems are: La-Ho, Ce-Gd, Ce-Ho, Nd-Gd, and Nd-Ho. The systems were studies primarily by metallography and X-ray diffraction techniques. The limits of the single-phase terminal solid solutions and the two-phase regions were determined. Lattice parameters for the intermediate phases were determined, and the approximate composition of each was established. A complete metallographic analysis of the phase equilibria in each system is presented. The position of the intermediate phase correlates well with a size effect factor of the two components in each respective system. (Author)

AD-430 152 Div. 17, 25
OTS price $2.60

General Dynamics/Fort Worth, Tex.
MATERIALS - 7075-T6 ALUMINUM ALLOY - CUMULATIVE DAMAGE EFFECTS - INVESTIGATION OF -.
15 Jan 64, 23p. Rept. no. FTDM2892
Contract AF33 657 11214
Unclassified report

Descriptors: (*Aluminum alloys, Fatigue (Mechanics)), (*Fatigue (Mechanics), Aluminum alloys), Magnesium alloys, Zinc alloys, Experimental data, Tensile properties, Stresses, Loading (Mechanics), Test equipment, Damage, Jet bombers.

The S-N curves and the results of various multiple loadings on individual specimens from a single plate of 7075-T6 aluminum alloy are presented as empirical data for the evaluation of methods of cumulative fatigue damage assessment. (Author)

AD-430 165 Div. 17, 27
OTS price $1.25

Defense Metals Information Center, Columbus, Ohio.
A REVIEW AND COMPARISON OF ALLOYS FOR FUTURE SOLID-PROPELLANT ROCKET-MOTOR CASES.

15 Nov 63, 44p. Memo. no. 184
Contract AF33 615 1121, Proj. 8975
Unclassified report

Descriptors: (*Rocket cases, Alloys), (*Titanium alloys, Rocket cases), (*Steel, Rocket cases), (*Aluminum alloys, Rocket cases), Reviews, Mechanical properties, Welding, Heat treatment, Data, Tables.

Metallic materials for solid-propellant rocket-motor cases in the period 1965-1970 probably will be confined to steel and alloys of titanium and aluminum. Of the three, titanium alloys have the greatest potential on the basis of usable strength-to-density ratio, followed by steel and aluminum alloys. Of the potential steel alloys, by far the most of the current development work is being done on the 18 per cent nickel maraging steels. These steels have the promise of good fracture toughness at high strength levels, and perhaps most important, their heat treatment is favorable for the fabrication of very large boosters, compared to steels that must be austenitized after forming. Of steels that must be austenitized, quenched, and tempered, the modified silico-manganese steels, S5 tool steels, and AISI 9250 spring steel have outstanding potential. Titanium alloys continue to be relatively expensive, but they still have the greatest strength-to-density potential, and, in addition, possess outstanding resistance to corrosion. Development of new titanium alloys is being pursued with the possibility of better titanium alloys being developed. Even though aluminum alloys are not now used in rocket-motor case fabrication, newer alloys are being developed and tested, and may be feasible for such applications in the future. (Author)

AD-430 276 Div. 17, 30
OTS price $1.60

Technische Hochschule, Vienna (Austria).
APPARATUS FOR CARRYING OUT THERMAL ANALYSIS (Anlage zur Thermischen Analyse von se),
by F. Lihl. 31 July 62, 16p. Rept. no. TN1
Contract AF61 052 609
Unclassified report

Descriptors: (*Pyrolysis, Rare earth elements), (*Rare earth elements, Pyrolysis), (*Laboratory equipment, Microanalysis), (*Microanalysis, Rare earth elements), Alloys, Phase studies, High temperature research, Chemical analysis, Temperature control, Controlled atmospheres, Helium group gases, Materials, Instrumentation, Purification, Laboratory furnaces.

The report discusses an apparatus for carrying out thermal analyses of rare earths. The apparatus serves for the examination of smallest samples at temperatures up to 1600 C. The apparatus has been mechanized to a great extent with regard to large-scale measurements. In order to give this apparatus a wide range of other applications, an electronic control equipment was developed that allows for the best possible adaptation to the required heating and cooling conditions. Ultra-purification of the protective gases will prevent chemical changes in the samples. (Author)

AD-430 353 Div. 17
OTS price $1.60

General Dynamics, Ft. Worth, Tex.
SURFACE TRANSFORMATIONS IN AN IMPACTED STEEL ROD,
by R. D. Potter. 1 July 63, 20p. Rept. no. ERR FW213
Contract AF33 657 11214
Unclassified report

Descriptors: (*Steel, Transformations), (*Impact shock, Steel), Microstructure, Martensite, Ablation, Surfaces, Rods, Plasticity, Hardness, Heating, Quenching (Cooling), Time.

A SAE 1035 steel was impacted on its end, resulting in ablation of the steel surface by a highly plastic material flowing under the impact effect and causing high rate transformations of the steel's microstructure. (Author)

AD-430 357 Div. 17, 25
OTS price $2.60

Madrid U. (Spain).
PROPERTIES OF FERROMAGNETIC MATERIALS INSIDE THE MATRIX OF ANODIZED ALUMINIUM COATINGS.
Final technical rept., 1 Jan-31 Dec 63,
by J. M. Alameda. 31 Dec 63, 23p.
Contract DA91 591EUC2791
Unclassified report

Descriptors: (*Aluminum, Coatings), (*Coatings, Porosity), (*Porous materials, Impregnation), Plating, Reduction (Chemistry), Pyrolysis, Films, Metal films, Cobalt, Nickel, Palladium, Silver, Electromagnetic properties, Electrical conductance, Dielectric properties, Ferromagnetic materials, Magnetostriction, Aluminum compounds, Oxides, Heat treatment, Crazing, Finishes & finishing, Iron, Metal-organic compounds.

Methods for impregnating porous anodized aluminum coatings with magnetic substances and the basic behaviour of such complex structures were investigated. By use of electroless plating processes chemical reduction, and by thermal descomposition, taking place in situ, of metal-organic salts deposition inside the pores of metallic cobalt, iron, nickel, palladium and silver were achieved. These structures were studied with a torsion magnetometer, a vibration coercimeter, and a B-H electronic tracer. It was found that any type of metal or compound impregnating the pores was neither electrically conductive nor ferromagnetic, including samples heat treatmented 400 C for five hours. (Author)

AD-430 386 Div. 17
OTS price $4.60

Wyman-Gordon Co., Worcester, Mass.
THE FABRICATION OF BERYLLIUM POWDER FORGING,
by N. G. Orrell. 1963, 48p. Rept. no. RD63 105
Unclassified report

Presented at The University of California in the course Beryllium -- Its Properties and Applications, 4-8 Mar 63.

Descriptors: (*Beryllium, Material forming), (*Powder metals, Forging), Powder metallurgy, High-pressure research, Containers, Quality control, Particle size, Heating, Degasification, Hydraulic presses, Hot working, Dies, Design, Mechanical properties, Tensile properties, Chemical analysis, Symposia.

The powder forging process as applied to beryllium is described. About 2000 powder forgings in 18 configurations ranging in weight form 5 to 1200 lb were produced during the past 4 years.

Carefully selected Be powder is placed in a can, basically a light-gage welded container of steel, with a design depending on the shape of the finished part and provided with loading and vent ports. The cans are vibrated as the powder is added and about 50% of full density is obtained. The powder cans are retreated long enough to permit the inner mass to reach about 1000 F, at which time out-gassing is completed and the ports are closed by welding. The powder cans are then heated from 4 to 5 hours at 1800 F, transferred to a hydraulic press, and forged in one pass to final shape. After slowly cooling in air the can is removed by pickling or mechanical means and the forging machined to specifications. The mechanical properties of powder forged Be are intermediate between those produced by press sintering and by solid forging. (Author)

AD-430 423 Div. 17, 25, 30, 15
OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
PROCEDURE IN CORRECTING FOR MATRIX EFFECTS IN FLUORESCENT X-RAY ANALYSIS, PART II,
by Masakatsu Sugimoto. 7 Feb 64, 19p.
RSIC 130 Unclassified report

Trans. from Bunseki Kaguku, Vol. 12, pp. 475-483, 1963.

Descriptors: (*Stainless steel, X-ray absorption analysis), (*X-rays, Fluorescence), (*Nondestructive testing, X-ray absorption analysis), Numerical analysis, Matrix calculus, Equations, Nickel, Molybdenum, Chromium, Manganese, Iron, Chemical analysis.

The correction equation previously derived to correct for changes in composition of routinge samples, was elaborated upon to give more practical correction equations utilizing a slope correction or a parallel displacement of the calibration curve. These corrections were done by linear combination. By setting up the various correction factors, it is possible to analyze several kinds of steels with good accuracy without the need to construct several calibration curves. The following can be said on the results of this study: (i) Correction by parallel displacement was derived for cases where there were no great changes in sample composition. However, it was found to follow linearly changes in Cr content between 6-20 percent; (ii) The parallel displacement procedure is more convenient for practical purposes than the slope correction method; (iii) A one percent change in Ni content will alter Cr content by 0.12 percent, one percent Mn by 0.20 percent, and one percent Mo by 0.36 percent; and (iv) Consequently, the samples taken as reference must be completely random in composition; otherwise, there will be unsatisfactory features to the slope or the intercepts. (Author)

AD-430 443 Div. 17, 25, 7
OTS price $1.60

Du Pont De Neumours' E. I. and Co., Inc., Wilmington, Del.
HIGH TEMPERATURE THERMOELECTRIC GENERATOR.
Quarterly rept., 13 June-30 Sep 63,
by W. T. Hicks and H. Valdsaar. 30 Sep 63, 11p.
Contract NObs88639 Unclassified report

Descriptors: (*Thermoelectricity, Generators), Thermocouples, Semiconductor devices, Performance (Engineering), Metals, Bonding, Tungsten compounds, Selenides, Lead compounds, Tellurides, Heat, Degradation, Copper alloys, Nickel alloys, Gold, Foils, Iron, Laboratory furnaces, Tungsten, Tungsten alloys, Selenium alloys.

Details are given of experiments on the formation of strong, stable, low-resistance bonds between doped WSe_2 and constantan capsules at the hot end of the thermoelectric modules being designed into a practical generator. A number of modules have been fabricated and tested. An arrangement incorporating gold foil, tungsten and iron between the selenide and the nickel heated surface now appears optimum. Coating the hot end with an aluminide confers satisfactory exidation resistance to the constantan. Design of the generator is in progress. Use of about 200 WSe_2-PbTe elements is contemplated, energized by a commercially available, high-efficiency burner. (Author)

AD-430 455 Div. 17, 25, 7
OTS price $1.60

General Electric Co., West Lynn, Mass.
RESEARCH AND DEVELOPMENT OF MATERIALS AND FABRICATION TECHNIQUES FOR THERMOELECTRIC POWER GENERATION.
Quarterly progress rept. no. 6, 15 May-16 Aug 63. 16 Sep 63, 15p.
Contract NObs86854, Proj. SR007 12 01, Task 802
Unclassified report

Descriptors: (Semiconductors, Thermoelectricity), Magnesium alloys, Antimony alloys, Bismuth alloys, Hall effect, Resistance (Electrical), Eutectics, Phase studies, Crystal lattice defects.

The values of the carrier mobilities and effective masses given for Mg_3Sb_2 in the literature were found to contain serious errors. The sources of these errors are discussed in the text; it is pointed out that the true values of the effective masses are probably much smaller, and the true values of the mobilities are probably much larger, than those which have been reported. The compositions and some of the properties of three magnesium-antimony and two magnesium-bismuth preparations are described. The room temperature thermoelectric figure of merit of one of the magnesium-bismuth preparations has been measured, and found to be a rather large value for an undoped specimen. (Author)

AD-430 513 Div. 17
OTS price $1.10

General Dynamics, Fort Worth, Tex.
BRAZED TITANIUM - ATMOSPHERIC EXPOSURE - EVALUATION,
by E. W. Turns. 15 Jan 64, 5p. Rept. no. FTDM2988
Contract AF33 657 11214
Unclassified report

Descriptors: (*Titanium alloys, Sandwich panels), (*Soldered joints, Degradation), Environmental tests, Brazing, Compressive properties, Tensile properties, Aluminum alloys, Chromium alloys, Iron alloys.

Two years of weathering on a brazed R.S. 140 titanium panel did not appreciably affect its physical strength. (Author)

AD-430 537 Div. 17, 27
OTS price $1.10

Arde-Portland, Inc., Paramus, N. J.
CRYOGENIC STRETCH-FORMING OF SOLID-PROPELLANT ROCKET CASES,
Quarterly rept. no. 6, 1 Sep-30 Nov 63,
by George Claffy. 30 Nov 63, 11p.
Contract DA30 069ORD3501
Unclassified report

Descriptors: (*Stretch forming, Cryogenics), (*Rocket cases, Stretch forming), Precision finishing, Stresses, Hydroforming (Mechanical), Dies, Hydrostatic pressure, Mechanical properties, Cold working, Pressure vessels.

Ten subscale preform vessels were fabricated and cryogenically stretched. Four of these were trial units, stretched at various stress levels. The final six units were all stretched at the same stress level to determine reproducibility of shape and conformance to blueprint dimensions. Room-temperature hydrotests were conducted on the four trial subscale vessels. In addition, a vessel which had been stored for one year after cryogenic stretching was hydrotested. The results indicate that properties do not deteriorate with time. Profile measurements were taken on the six stretched subscale vessels. Small deviations from blueprint dimensions were observed in both the forward and aft closures. (Author)

AD-430 577 Div. 17
OTS price $1.60

Marquardt Corp., Van Nuys, Calif.
PRELIMINARY EVALUATION OF FOUR COLUMBIUM BASE ALLOYS FOR COATING CAPABILITIES AND MECHANICAL PROPERTIES AT ELEVATED TEMPERATURES. ADDENDUM I. STRUCTURAL BRAZING AND ALUMINIDE COATING,
by J. C. Reeves. 12 Feb 64, 11p. Rept. no. 6012, A1
Contract AF33 657 10795, Proj. 297
Unclassified report

Report no. 6012, add. 1 to report no. 6012, AD-421 620.

Descriptors: (*Niobium alloys, Brazing), (*Protective treatments, Niobium alloys), Soldered joints, Silver solders, Tensile properties, Shear stresses, Oxidation, High-temperature research, Refractory coatings, Aluminum compounds, Tin compounds, Silicides, Brittleness, Metal coatings, Tungsten.

The evaluation of titanium-brazed niobium base alloys coated with Nb disilicide was completed. These tests indicated catastrophic embrittlement of the braze joint area. Preliminary testing of brazed joints protectively coated with aluminide and tested at 2600 F in air indicated retention of basic Nb alloys base metal properties without any adverse effect (decline of values) or embrittlement on the braze joint area. (Author)

AD-430 703 Div. 17, 26
OTS price $21.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE WORKING OF HEAT-RESISTANT ALLOYS (Obrabotka Zharoprochnykh Splavov),
ed. by V. I. Dikushin. 26 Nov 63, 387p.
FTD TT63 344 Unclassified report

Trans. from Izdatel'stvo Akademii Nauk SSSR, pp. 1-231, 1960.

Descriptors: (*Heat resistant metals and alloys, Material forming), (*Symposia, Metallurgy), Melting, Casting, Machining, Welding, Metal forming presses, Metal coatings, Cutting tools, Metals, Alloys, Material removal.

This collection presents 30 papers that were read through at the conference on working of heat-resistant alloys, which was held on 18-21 December 1957 by the commission in charge of machine-building techniques at the Machine-Construction Institute of the Acad. Sci., USSR. The collection consists of four sections: (1) casting of heat-resistant alloys; (2) pressure working of heat-resistant alloys; (3) welding of heat-resistant alloys; and (4) cutting of heat-resistant alloys. Publication of the transactions executed at this conference makes it possible to draw inferences on data accumulated by machine builders as regards working of heat-resistant alloys for the purpose of coordinating experimental studies in this vital field. (Author)

AD-430 751 Div. 17, 20, 30
OTS price $2.60

Naval Research Lab., Washington, D. C.
ENCAPSULATION TECHNIQUES FOR NRL IRRADIATION EFFECTS STUDIES.
Progress rept.,
by L. E. Steele and J. R. Hawthorne. Dec 63, 23p.
Proj. SR007 01 01, Task 0858
NRL MR1481 Unclassified report

Descriptors: (*Steel, Radiation damage), (*Containers, Design), Encapsulation, Nuclear reactors, Reactor materials, Test reactors, Mechanical properties, Thermal radiation, Power reactors, Stainless steel, Aluminum, Test facilities.

Various systems and techniques for encapsulation of irradiation experiments have been devised in the course of several years of research using several AEC test reactor facilities. A capsule design philosophy has evolved which is based upon the use of two types of capsules, sealed units and externally controlled units for the irradiation of large numbers of metallurgical specimens under a range of thermal and nuclear conditions. The basic philosophy of capsule design is described along with specific techniques utilized for various test reactor capsules and for long-term power reactor surveillance capsules. (Author)

AD 430 773 Div. 17, 26
OTS price $1.60

Fansteel Metallurgical Corp., North Chicago, Ill.
COLUMBIUM ALLOY SHEET ROLLING PROGRAM.
Interim bi-monthly progress rept. no. 5,
7 Nov 63-6 Jan 64,
by H. L. Kohn and R. M. Curcio. 7 Jan 64, 18p.
Contract NOw63 0231c
Unclassified report

Descriptors: (*Niobium alloys, Material forming), (*Sheets, Rolling (Metallurgy)), Tantalum alloys, Tungsten alloys, Zirconium alloys, Vanadium alloys, Molybdenium alloys, Chemical analysis, Mechanical properties, Tensile properties, Elasticity, Ductility, Cryogenics, High temperature research, Stresses, Rupture, Reentry stablization, Arc welds.

Testing of FS-85 (Nb-27Ta-10W-1Zr) 0.060-in.-thick x 18-in.-wide sheet was completed. These data are presented. Further processing of B-66 (Nb 5V-5Mo-1Zr) to 0.060-in.-thick sheet is described. (Author)

Division 17 - METALLURGY

AD-430 831 Div. 17
OTS price $1.60

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
THE ROLE OF OXYGEN IN THE BRITTLE BEHAVIOR OF METALS ZONE REFINING PHASE.
Progress rept. no. 10, 1 Sep 61-1 Oct 63,
by Marshall K. Thomas and Edwin S. Tankins.
28 Jan 64, 16p.
NAEC AML 9R360FR101 Unclassified report

Descriptors: (*Molybdenum, Zone melting), (*Zone melting, Molybdenum), Electron beams, Induction heating, Purification, Impurities, Rods, Design, Operation, Vacuum furnaces, Oxygen, Brittleness, Melting, Degassification.

The basic principles of the zone refining process are discussed. An electron beam zone refiner was built and has been used to successfully produce zone refined molybdenum rods. Additionally, a commercially manufactured induction zone refiner was purchased and several 1/4 in. diameter zone refined molybdenum rods have been purified with it. Improvements in the filament design have compensated for some of the problems created by molybdenum vapor deposition. (Author)

AD-430 902 Div. 17, 25
OTS price $8.10

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
DEFORMATION CHARACTERISTICS OF THIN FOILS AND COMPOSITES.
Final rept.,
by Alan Lawley, Horace L. Gaigher and Sidney Schuster. Jan 64, 81p. Rept. no. F A2366
Contract Nonr299200
Unclassified report

Descriptors: (*Foils, Deformation), (*Metal films, Tensile properties), Copper, Gold, Iron, Molybdenum, Silver, Thickness, Single crystals, Creep, Crystal lattice defects, Stresses, Strain (Mechanics), Grain structure (Metallurgy), Crystal structure, Cold working, Cryogenics, Low temperature research, Electron microscopy.

The tensile behavior of copper foils prepared from rolled bulk material has been studied over the thickness range 2 to 53 microns, and for a wide range of grain sizes. For foils of comparable grain size, yield strength increases with decreasing foil thickness t below about 26 microns, with a corresponding decrease in ductility. Glide dislocation configurations in zone melted single crystals of molybdenum, deformed in tension at temperatures in the range 4.2 to 300 K, have been examined by thin film electron transmission microscopy. The slip band structure is characterized by long primary screw dislocations. Consistent with the presence of secondary slip, the bulk stress-strain curves do not exhibit a region of easy glide. (Author)

AD-430 908 Div. 17, 25
OTS price $2.25

Harry Diamond Labs., Washington, D. C.
FRETTING CORROSION. A LITERATURE SURVEY,
by Raymond H. Comyn and Cita Wright Furlani.
30 Dec 63, 98p.
Proj. 46300
HDL TR1169 Unclassified report

Descriptors: (*Corrosion, Joints), (*Bearings, Corrosion), (*Metal joints, Corrosion), Friction, Damage, Fatigue (Mechanics), Vibration, Reviews, Bibliographies, Surface properties, Theory, Electrical properties, Lubricants, Protective treatments, Test methods, Metals, Materials.

Data from over 200 reports from the English literature on fretting corrosion were summarized for ready reference--for engineers who must consider its effect in designing mechanical and electrical devices and for scientists who may wish to investigate the underlying mechanism. The actual wear, frictional changes, variations in electrical resistances and electrical noise, and fatigue due to fretting are described to acquaint the designer with difficulties to be anticipated from this problem. Factors affecting fretting, its effect on the fatigue strength of materials and methods of preventing it are discussed. The main theories that have been proposed to explain fretting corrosion and test methods that have been used to study it are reviewed. (Author)

AD-430 911 Div. 17
OTS price $2.60

Manufacturing Labs., Inc., Cambridge, Mass.
THERMOMECHANICAL TREATMENTS APPLIED TO ULTRA-HIGH-STRENGTH BAINITES.
Progress rept. no. 5, 15 Oct-15 Dec 63.
15 De- 63, 28p.
Contract N600 19 59811
Unclassified report

Descriptors: (*Steel, Transformations), (*Tool steel, Hardening), Chromium alloys, Iron alloys, Austenite, Bainite, Martensite, Heat treatment, Deformation, Mechanical working, Temperature, Cold working, Hot working, Quenching (Cooling), Crystal structure, Microstructure, Cryogenics, Electron microscopy, Microscopy, X-ray diffraction analysis, Metallography, Mechanical properties.

Retained austenite determinations were made in H11 which had been subjected to various thermal and thermomechanical treatments. It was found that up to 35% austenite is retained when bainite is formed at 550 F from either deformed or undeformed austenite. For tempering temperatures below 1000 F, retained austenite has a considerable effect on the yield strength of the mixed structure. The influence of retained austenite on the yield strength is not directly proportional to its volume percent. (Author)

AD-430 913 Div. 17, 26
OTS price $10.10

Wah Chang Corp., Albany, Oreg.
REDUCTION AND CONSOLIDATION OF SUPERIOR QUALITY MOLYBDENUM ALLOYS.
Final rept., 3 Mar 60-31 Dec 63,
by Chun T. Wang. 31 Dec 63, 124p. Rept. no. 1001 9
Contract NOas60 6046c
Unclassified report

Descriptors: (*Molybdenum alloys, Material forming), (*Molybdenum, Material forming), (*Molybdenum compounds, Reduction (Chemistry)), Calcium, Hydrogen, Melting, Electron beams, Electric arcs, Extrusion, Rolling (Metallurgy), Sheets, Recrystallization, Hardness, Mechanical properties, Tensile properties, Crystal structure, Microstructure, Oxides, Powder metallurgy, Single crystals, Metallic crystals, Grain structure (Metallurgy), Boron, Heat treatment, Sintering.

Various efforts to produce superior quality molybdenum have been conducted, which include bomb reduction, electron beam melting, and powder metallurgy techniques. Fabrication and evaluation of sintered, electron beam melted and arc melted molybdenum, both calcium-reduced and hydrogen-reduced, have been investigated. Single crystals were fabricated and evaluated and grain refinement additions were investigated. (Author)

AD-430 978 Div. 17
OTS price $1.50

Watervliet Arsenal, N. Y.
STRESS-AGING: A NEW TREATMENT FOR ALLOYS PART ONE: EFFECT ON STANDARD TENSILE PROPERTIES OF STAINLESS STEELS,
by R. H. Harrington. Nov 63, 56p.
DA Proj. 1F5 23801A289 01
WVT RR6313 Unclassified report

Descriptors: (*Alloys, Hardening), (*Stainless steel, Hardening), (*Stresses, Aging (Materials)), Tensile properties, Ductility, Elasticity, Temperature, Time, Solid solutions, Electrical conductance, Copper alloys, Tin alloys, Heat treatment, Strain (Mechanics).

Stress-Aging is a new treatment for alloys that results in concurrent increases of proportional limit, 0.1% offset yield strength, percent elongation and percent reduction of area. In general, for the three stainless steels (17-7PH, 17-4PH and AM355), the proportional limit (conservative measure of practical elasticity) may be increased by 100%, the 0.1% offset yield strength (a design factor) may be increased by 50,000 psi, with concurrent increases of 25-40% in percent elongation and 50% in percent reduction of area. Possible stress-aging reactions are discussed relative to the measured changes in properties that have been observed. Similar effects have been observed in other iron-base alloys and in copper-base and aluminum-base alloys. Ensuing reports will describe similar improvements currently being found in a typical gun steel and in four low-alloy ultra-high strength steels. (Author)

AD-430 994 Div. 17, 25
OTS price $1.10

Stanford Electronics Labs., Stanford U., Calif.
DIFFUSION AND SOLUBILITY OF IMPURITY ELEMENTS IN COMPOUND SEMICONDUCTORS.
Final rept.,
by G. L. Pearson. Dec 63, 10p. Rept. no. 63 147
Contract DA04 200ORD1087; Grant DA ARO D31 124G338
AROD 2895 7 Unclassified report

Descriptors: (*Semiconductors, Impurities), (*Impurities, Diffusion), (*Zinc, Diffusion), Arsenides, Arsenic alloys, Arsenic compounds, Phosphides, Phosphorus alloys, Phosphorus compounds, Gallium alloys, Gallium compounds, Group III elements, Group V elements, Solubility, Diodes (Semiconductors), Numerical analysis, Temperature, Electrical properties, Crystal lattice defects, Crystal lattices.

The diffusion of some impurity elements into III - V compounds is anomalous in that the diffusion coefficient is strongly concentration dependent. Careful measurements were made on the diffusion of Zn into both GaAs and GaP. A careful analysis of these results leads to the conclusion that diffusion occurs by an interstitial-substitutional mechanism, with the interstitial mode being dominant in the over-all process. The solubilities and distribution coefficients of Zn in these two semiconductors have been calculated as functions of temperature up to the melting point of the solvents. A sharp increase in the distribution coefficient near the melting point is accounted for by considering the transfer of neutral Zn from the liquid to the solid, where some Zn atoms become ionized acceptors. The relation between solid solubility and Zn vapor pressure at a fixed temperature has been investigated and theoretical calculations give results in good agreement with the experimental data. (Author)

AD-431 023 Div. 17, 25
OTS price $3.60

Michigan U., Coll. of Engineering, Ann Arbor.
INVESTIGATION OF LIQUID METAL BOILING HEAT TRANSFER.
Quarterly progress rept. no. 3, 15 Nov 63-15 Feb 64,
by Richard E. Balzhiser, Robert E. Barry, Bruce F. Caswell, Herman Merte, Jr., and Andrew Padilla, Jr. Feb 64, 35p. Rept. no. 057 50 9P
Contract AF33 657 11548, Proj. 05750
Unclassified report

Descriptors: (*Liquid metals, Heat transfer), Sodium, Potassium, Water, Film boiling, Nucleate boiling, Liquid metal cooled, Reactors, Laboratory furnaces, Coolants, Pressure, Heat, Vaporization.

Burnout data were obtained for water and sodium in the same equipment used previously for potassium studies. Further studies with sodium will be attempted after which rubidium will be charged to the system and similar studies undertaken. Recent film boiling data obtained by condensing sodium on the bottom side of a horizontal disk on top of which potassium is boiled have yielded inconclusive results. Stable film boiling was observed to have occurred with the pressure in the potassium chamber less than 1 inch of mercury. Upon increasing the power to the sodium instabilities were observed which caused the system to oscillate as if in the transition regime. The forced circulation apparatus was used early in this last quarter to obtain additional two phase pressure drop data. An analysis of the two phase pressure drop data has revealed departures from the Martinelli-Nelson or Lockhard type of correlation. Similar deviations have been observed with other data for metallic fluids. A friction factor correlation is proposed which correlates data for metallic systems. (Author)

AD-431 044 Div. 17, 25, 26
OTS price $7.60

Illinois U., Urbana.
EFFECT OF WELD FLAWS ON THE FATIGUE BEHAVIOR OF BUTT-WELDED JOINTS IN HY-80 STEEL,
by A. J. Hartmann, W. H. Bruckner, J. L. Mooney and W. H. Munse. Dec 63, 78p. Rept. no. SRS275
Contract NObs88058, Proj. SR007 01 01, Task 856
Unclassified report

Descriptors: (*Welds, Fatigue (Mechanics)), (*Steel, Welds), Metal plates, Porosity, Welding rods, Stresses, Fracture (Mechanics), Mechanical properties, Radiography, Slags, Photomicrography.

Results of axial fatigue tests of butt-welded joints containing flaws are reported. The flaws studied include porosity, slag inclusions, lack of penetration, and weld undercut. A number of plain plate and sound butt-welded specimens were

also tested; they provide a basis of comparison for the test results of specimens containing flaws. The tests were carried out using two types of stress cycle, zero-to-tension and complete reversal. The tests indicate that a large decrease in the fatigue strength of butt-welded joints may occur even when the flaws are relatively small. During a number of fatigue tests, radiographs were taken of the weld flaw in order to study crack initiation and propagation. A series of fatigue tests were carried out on 1-1/2 in.-thick butt-welded joints (reinforcement removed) to study the effect of residual stresses on their fatigue behavior. (Author)

AD-431 106 Div. 17
OTS price $1.10

Notre Dame U., Ind.
ORDER-DISORDER TRANSFORMATION IN METALLIC ALLOYS.
Final rept., Jul 54-Jul 61,
by G. C. Kuczynski. Jan 64, 5p.
Contract N7onr43908
Unclassified report

Descriptors: (*Alloys, Crystal lattice defects), (*Crystal lattices, Transformations), Gold alloys, Copper alloys, Nucleation, Temperature, Stresses, X ray diffraction analysis, Resistance (Electrical).

AD-431 114 Div. 17
OTS price $4.60

Southern Research Inst., Birmingham, Ala.
MECHANICAL AND PHYSICAL PROPERTIES OF TZM MOLYBDENUM ALLOY SHEET AND OF TUNGSTEN SHEET.
Quarterly progress rept. no. 5, 1 Nov-31 Jan 64.
28 Feb 64, 44p.
Contract N600 19 59530
Unclassified report

Descriptors: (*Refractory metals and alloys, Sheets), (*Tungsten, Mechanical properties), (*Molybdenum alloys, Mechanical properties), Titanium alloys, Zirconium alloys, Tensile properties, Shear stresses.

Progress is reported on a program to determine preliminary design data for tungsten and TZM molybdenum sheet produced in Phase I of the Refractory Metal Sheet Rolling Program. Efforts included the preparation of specimens from the tungsten sheet materials, compression and evaluations on the sheet in the recrystallized condition, additional bend evaluations on tungsten sheet in the optimum condition, tensile evaluations at room temperature and up to 2000 F on the tungsten sheets in the optimum condition, and nitration of room-temperature shear-strength determinations. The required specimen blanks for all of the scheduled evaluations on the TZM were sheared from two of the sheet thicknesses to be evaluated. Arrangements were made with Universal-Cyclops to fabricate 14 each fusion- and spot-welded specimens of the TZM and tungsten materials. (Author)

AD-431 127 Div. 17
OTS price $3.60

Pennsylvania U., School of Metallurgical Engineering, Philadelphia.
MICROYIELD STUDY OF DISPERSION STRENGTHENING IN SPHEROIDIZED STEEL AT ROOM TEMPERATURE,
by R. Kossowsky and N. Brown. 7 Feb 64, 33p.
Contract Nonr55120
Unclassified report

Studies of the Early Stages of Plastic Deformation.

Descriptors: (*Steel, Dispersion hardening), (*Dispersion hardening, Theory), Heat treatment, Stresses, Strain (Mechanics), Creep, Electromicroscopy, Crystal lattice defects.

Plain carbon steels with 0.48 and 0.95% C were quenched and tempered to 705 C to produce carbide dispersions with spacings on the order of 1 micron. The morphology of the structure consisted of a carbide-dislocation network. The strengthening due to the dispersion was found to vary linearly with M to the -1/2 power where M is the mean free-ferrite path determined by the entire network. No preyield microstrain preceded the upper yield point. After prestraining the lowest stress at which dislocation movement could be detected was 10 to the 4th power psi; this functional stress was independent of the dispersion and prestrains up to 6.5%. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-429 939 Div. 18
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SHOULD NOT ONE TURN THE SHIELD INTO A SWORD,
by S. Savosin. 2 Jan 64, 8p.
FTD TT63 1129 Unclassified report

Trans. from Krasnaya Zvezda No. 116, 19 May 62.

Descriptors: (*Aerial warfare, Jet fighters), (*Jet fighters, Aerial warfare), Formation flight, Effectiveness.

AD-429 940 Div. 18
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A PAIR OF AIRPLANES -- A HARD LITTLE NUT,
by B. Ivanov. 8 Jan 64, 5p.
FTD TT63 1130 Unclassified report

Trans. from Krasnaya Zvezda No. 167, 18 July 62.

Descriptors: (*Aircraft interception, Military tactics), Aerial warfare, Fighters, Bombers, Jet fighters.

AD-429 985 Div. 18, 33
OTS price $1.60

RAND Corp., Santa Monica, Calif.
CONSIDERATIONS IN THE ANALYSIS OF ALTERNATIVE POSTURES FOR RAPID DEPLOYMENT OF COMBAT FORCES,
by Richard B. Rainey, Jr. Oct 63, 12p. Rept. no. P2811
Unclassified report

Descriptors: (*Air transportation, Military personnel), (*Armed forces transportation, Air transportation), Logistics, Cargo, Army equipment, Costs.

The first comprehensive work at RAND on prepositioning as a potential complement to airlift capability in rapid deployment to remote areas was begun in 1958. The desirability of peacetime overseas stockage of the materiel required to support the initial combat operations of ZI-based tactical air units is examined. The study examined states two contrasting policies--one requiring comparatively modest amounts of materiel but a large transport fleet, and the other requiring greater amounts of materiel but fewer transports. The first policy, that requiring large amounts of airlift, kept in the ZI the amount of each item required to support a specified limited war mission. This material although used for training operations in peacetime would have to be airlifted to the combat area in wartime. The second policy involved overseas stockage or prepositioning. In addition to the materiel needed for ZI training operations, an equal amount of each line item necessary for combat operation was assumed to be stocked in peacetime at one location in each of two war theaters. This policy, therefore, involved relatively large amounts of materiel and relatively little airlift capacity. (Author)

AD-430 059 Div. 18, 16, 20
OTS price $9.60

Hudson Inst., Harmon-on-Hudson, N. Y.
SPECIAL ASPECTS OF ENVIRONMENT RESULTING FROM VARIOUS KINDS OF NUCLEAR WARS. PART II THE USE OF SCENARIOS FOR EVALUATING POSTATTACK DISUTILITIES,
by Robert U. Ayres. 8 Jan 64, 114p. Rept. no. HI 303 RR
Contract OCD OS62 218, Task 3511A
Unclassified report

Descriptors: (*Nuclear warfare, Ecology), (*Disasters, Ecology), Damage, Epidemiology, Agriculture, Diet, Erosion, Diseases, Fires, Public health, Insects, Animals, Climatology, Industries, Population, Urban areas, Rural areas, Ammunition damage, Man, Survival, Countermeasures.

Various approaches were explored to help identify the most salient environmental disutilities which might result from a nuclear war. Particular attention was directed toward an attempt to evaluate the likelihood of occurrence (assuming a nuclear attack of specified kind) and the severity of the effects. The principal analytic tool used is the scenario. Twelve scenarios were written covering a wide range of attacks and weapons effects. Each scenario is accompanied by a detailed commentary including examples of similar past events, relevant data (or sources), discussion of the applicability of chosen examples and possible branch points which would result in similar or parallel series of events. With each scenario is included a list of possible specific protective measures and countermeasures. A unified discussion is included of all the countermeasures suggested by the scenarios. The discussion is illustrated by a possible environmental countermeasures budget of moderate size (about 25 million dollars) guided, at least partly, by some specific cost-effectiveness criteria. (Author)

AD-430 080 Div. 18
OTS price $1.60

RAND Corp., Santa Monica, Calif.
''OVERKILL'' AND THE MILITARY BUDGET: A REVIEW OF A STRATEGY FOR AMERICAN SECURITY -- AN ALTERNATIVE TO THE 1964 MILITARY BUDGET,
by Robert A. Levine. Jan 64, 17p. Rept. no. P2848
Unclassified report

Descriptors: (*Military strategy, Budgets), (*Budgets, Military requirements), Foreign policy, Nuclear weapons, Costs, Defense systems.

AD-430 188 Div. 18, 12
OTS price $6.60

Pacific Missile Range, Point Mugu, Calif.
A MONTE CARLO COMPARISON OF VARIOUS REPAIR-VERSUS-REPLACEMENT POLICIES,
by M. L. Eaton and C. E. Parker. 30 Jan 64, 66p.
PMR TM63 16 Unclassified report

Descriptors: (*Maintenance, Monte Carlo method), (*Guided missile ranges, Maintenance), Operations research, Costs, Theory, Decision making, Life expectancy, Tables, Mathematical analysis.

Four repair versus replacement policies are compared. The main objective of the study was to compare the current policy of Technical Support Directorate (policy 4) with that of policy 1. This suggestion divides the period from the last replacement to the end of need for this type of equipment into that number of equal periods for which expected cost per year will be less than for any other integer divisor. Usually, this results in replacement at a time near the tangent point (of a straight line through the origin) to the estimated parabolic cumulative cost curve.

To implement this suggestion, a method for estimating the required constants has been derived. Two additional policies have been included in this comparison. The policy of appendix F (policy 3) was derived by the authors and is included for comparative purposes. Policy 2 is an improved version (devised by the authors) of policy 1 where the size of the current repair cost is considered, in addition to the computed replacement time of policy 1. Data are actually analyzed to arrive a policy decisions. The data are manufactured, but by a wide variety of representative data generators. Actual field data could be processed in much the same fashion. (Author)

AD-430 247 Div. 18, 31
OTS price $4.60

Bureau of Ships, Washington, D. C.
ELECTRONIC ON-BOARD SPARE PARTS REQUIREMENTS,
by Philip Brown. 31 Oct 60, 44p.
BUSHIPS 342D1 Unclassified report

Descriptors: (*Naval equipment, Logistics), Tables, Shipborne, Maintenance, Modules (Electronic), Electronic equipment, Transmitter-receivers, Military requirements.

This paper presents a method and corresponding tables for the determination of on-board spare parts requirements and contains a discussion of the conditions under which the tabled values are applicable. Solutions are presented for the case where spare parts are repaired on-board and for the case of nonrepairable spare parts. An example is presented in terms of on-board spares provisioning for the URC-32 Transceiver, and certain aspects of providing for on-board repair are discussed. (Author)

AD-430 265 Div. 18, 28
OTS price $5.60

System Development Corp., Santa Monica, Calif.
ORGANIZATION DECISION-MAKING,
by Julian Feldman and Herschel E. Kanter.
30 Dec 63, 60p. Rept. no. SP1357
Unclassified report

Descriptors: (*Decision making, Projective techniques), Mathematical models, Theory, Probability, Statistical data, Correlation techniques.

Organizations are viewed as systems for making decisions, with emphasis on the process by which organizations select alternative courses of action. The theoretical and empirical work is discussed of economists, sociologists, psychologists, and political scientists who have studied the decision-making process in individuals and organizations. Some material from the study of decision-making in artificial systems, particularly from the research in artificial intelligence--the effort to program computers to perform intelligent tasks. A comprehensive model is considered which generates all alternative courses of action and examines all of the consequences of these alternatives for all relevant goals. Two methods used by individuals, organizations, and computer systems for reducing the search required by the comprehensive model are discussed. The processes used in the organization's search for alternatives and estimation of consequences are also considered. (Author)

AD-430 489 Div. 18, 23
OTS price $16.00

Army Concept Team in Vietnam, APO 143, San Francisco, Calif.
ENGINEER CONTROL AND ADVISORY DETACHMENTS.
Final test rept.
15 Oct 63, 248p.
Unclassified report

Descriptors: (*Counterinsurgency, Operations), (*Army operations, Engineering personnel), Effectiveness, Armed Forces (United States), Army, Control, Costs, Tactical air command, Engineering, Design, Military facilities, Vehicles, Materials.

This is the final report of a 120-day test conducted by the Army Concept Team in Vietnam to evaluate engineer control and advisory detachments (ECAD) in support of counterinsurgency operations. ECADs augment special action forces. Two ECADs were on TDY in Vietnam for testing. One control team and three advisory teams operated under the Senior MAAG Advisor, IV Corps. The other control team and two advisory teams worked with special forces detachments located in II, III, and IV Corps areas. Control teams provide engineer staff personnel for special action forces control elements and have an engineering design capability. Advisory teams advise indigenous forces on civic action type construction projects and train troops in engineer support of tactical operations. Advisory team mission equipment consists of a pioneer tool kit and a 3/4-ton truck. In line with President Kennedy's People-to-People program, ECAD effort was oriented toward civic action at the very lowest echelons of government. Small engineering projects were identified, planned, and coordinated with local authorities in areas of unit operation. Emphasis was on simple structures, which could be built with common hand tools from locally available materials. (Author)

AD-430 731 Div. 18
OTS price $8.10

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
TACTICAL AIR WARFARE FORCE ALLOCATION VOLUME 1. PROGRAM SUMMARY,
by Edwin W. Roth. Oct 63, 78p. Rept. no. ZF1782G1
Contract AF19 628 2801, Proj. 4690, Task 469002
ESD TDR63 664, Vol. 1 Unclassified report

Descriptors: (*Aerial warfare, Tactical warfare), (*Antiaircraft defense systems, Research program administration), Command & control systems, Aerial reconnaissance, Models (Simulations), Photographic reconnaissance, Surface-to-air, Defense systems, Air-to-air, Air Force, Air Force Systems Command.

The primary emphasis of the current research program is directed toward the formulation of a detailed data base, and the structuring of existing and newly-developed analytical models of an Air Component Commander's daily force allocation planning function. The information organization and models are applicable to the assignment of air resources among the tactical air missions of air superiority, interdiction, direct air support and reconnaissance. The results derived within this program are to be utilized within the System Design Laboratory's experimental program. The objectives of the experiments are to derive evaluative data concerning the relevance of information, and methods of processing, and presenting relevant information to the Air Force Commander and his staff. This volume presents a description and analysis of the current operations force allocation decision, and a technical summary of the data base and the compendium of force allocation planning models. (Author)

AD-431 058 Div. 18
OTS price $2.60

System Development Corp., Santa Monica, Calif.
PLANNING BY RESOURCE ALLOCATION METHODS - ILLUSTRATED BY MILITARY APPLICATIONS,
by James L. Taylor and John E. Walsh. 23 Jan 64, 27p. Rept. no. SP480 000 03
Unclassified report

Descriptors: (*Military organizations, Military strategy), (*Military strategy, Models (Simulation)), Targets, Weapons, Procurement, Industrial production.

This planning refers to the production and use of types of weapons that have already been developed. All combinations of target and type of weapon are considered. The problem is to distribute the total available resources among these combinations in such a manner that the value of the targets surviving the attacks is minimized. A deterministic model of a flexible nature for representing situations of this nature is developed. An elementary iterative method for solving the allocation of resources problem is obtained. These results are computer oriented and should be feasible for application even when the model is of an exceedingly complicated nature. (Author)

19. NAVIGATION

AD-429 468 Div. 19, 15
OTS price $4.60

Aeronutronic, Newport Beach, Calif.
INITIAL ORBIT DETERMINATION FROM LEAST SQUARES REDUCTION OF GEOCENTRIC POSITION VECTORS,
by T. L. Johnston and T. P. Smith. Jan 64, 40p. Rept. no. U2442
Contract AF19 628 562
ESD TDR63 649 Unclassified report

Descriptors: (*Orbital trajectories, Programming (Computers)), Least squares method, Space surveillance systems, Combat information centers, Satellites (Artificial).

A computer program for initial orbit determination based on a theory employing a linear least squares fit to the geocentric position vectors was developed. Observations can be spread over a number of days since this procedure does not use the times of observations; however, they are used in the differential correction procedure. This program coded for the Philco 2000, is designed for operational use at the space Detection and Tracking Center in Colorado Springs, Colorado. (Author)

AD-429 535 Div. 19, 26
OTS price $1.60

Sperry Gyroscope Co., Great Neck, N. Y.
RELIABILITY PRELIMINARY PHASE II REPORT. AN/ARN-76 LORAN NAVIGATIONAL SET.
Dec 63, 15p. Rept. no. CA4262 0004 2
Contract NOw62 0973d
Unclassified report

Descriptors: (*Loran, Reliability), Airborne, Maintainability, Handling, Low frequency, Navigational aids.

This report is concerned with the MTBF prediction of the AN/ARN-76 Loran Navigational Set and a discussion of some of its salient reliability and maintainability features. The coverage in this report is essentially the same as in the Phase I report (Sperry Report # C. A.-4262-0004-1), except that the reliability calculations are based on additional and more specific information. (Author)

AD-429 740 Div. 19
OTS price $10.10

National Co., Inc., Malden, Mass.
RHO-RHO NAVIGATION SYSTEM STUDY PHASE I.
Final rept.,
by L. F. Fenton. 18 July 63, 1v.
Contract FA WA4223, Proj. 116 8 8D
Unclassified report

Descriptors: (*Radio navigation, Time signals), (*Time signals, Propagation), Errors, Very low frequency, Diurnal variations, Ionosphere, Loran, Hyperbolic navigation, Aircraft, Navigational aids, Standards, Low frequency.

This final report contains the results of the analysis of a Rho-Rho Navigation System using a high-accuracy frequency standard in the aircraft, intended for transoceanic flights in the North Altantic area. Only the VLF (Omega) and LF (Loran-C) transmissions are considered practicable for this purpose, and the LF (Loran-C) system, having definite advantages, is recommended for use. Existing Loran-C stations across the Atlantic provide adequate coverage with sufficient navigational accuracy. After building the planned station in Newfoundland (probably in 1965) the positioning accuracy capability of this system will be even better. The Rho-Rho- Loran-C receiver can be made substantially simpler than the conventional Loran-C receiver. The tie-in of the proposed Rho-Rho Navigation System with the existing aircraft doppler-radar system is explored in this study. (Author)

AD-429 817 Div. 19
OTS price $5.60

Tactical Air Command, Langley Air Force Base, Va.
OPERATIONAL TEST & EVALUATION OF THE DECCA ROLLER MAP.
Final rept.,
by James E. McInerney, Jr., James I. Haag and Robert T. Starke. Jan 64, 1v.
TAC TR62 60 Unclassified report

Descriptors: (*Navigational aids, Display systems), (*Display systems, Navigation charts), (*Jet fighters, Navigational aids), Airborne, Maps, Performance (Engineering), Tests, Low altitude, Doppler navigation, Maintenance, Logistics.

This test evaluated the Mark II Roller Map. This unit uses inputs from the AN/APN-131 Doppler Navigation System to display aircraft present position directly on a flight chart. The Roller Map significantly improves the operational capability of the F-105D on low-level weapons delivery missions and offers a solution to the safety problems associated with cockpit map handling at low altitude. Several modifications are required to improve the operational capability of the equipment in an all-weather tactical strike fighter. These modifications are described in this report together with recommendations for the desired configuration of the Moving Map Display in future tactical fighter aircraft. (Author)

AD-429 876 Div. 19, 5, 28
OTS price $2.60

Decision Sciences Lab., Bedford, Mass.
HUMAN ENGINEERING EVALUATION OF A MOBILE AIR TRAFFIC CONTROL & COMMUNICATION SYSTEM, AN/TSQ-47,
by John Coules and Stephen E. Stuntz. Dec 63, 21p.
ESD TDR63 656 Unclassified report

Descriptors: (*Air traffic control systems, Human engineering), Mobile, Personnel, Hazards, Generators, Voice communication systems, Intelligibility.

The potential hazards to personnel of the gas turbine, power generators, were assessed for noise output and portability. Results showed moderate to severe hearing damage risk for personnel working in the vicinity of the generators. The generator unit appears to be an unsafe load for four airmen to lift and carry with the hand grips as configured. Speech intelligibility tests were conducted on a portion of the communication system. Results indicated potentially serious limitations of this equipment for field use. (Author)

AD-429 889 Div. 19
OTS price $6.60

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
SPECTRUM SIGNATURE COLLECTION PLAN FOR GCA RADAR SYSTEM AN/CPN-4.

by R. Harper, D. Farmer and W. Wydro. Jan 64, 1v.
Contract AF30 602 2888, Proj. 4540, Task 454001
RADC TDR63 517 Unclassified report

Descriptors: (*Ground controlled approach radar, Radar interference), Airport radar systems, Radiofrequency spectroscopy, Antenna radiation patterns, Test methods.

A study was made of the AN/CPN-4 Radar System to specify methods of evaluating both its susceptibility to a source of interference, and its characteristics as such a source. This is one of a class of new equipments being investigated to determine suitable methods for obtaining their spectrum signatures. The final result of this study is the recommendation of a set of test procedures which would adequately evaluate the interference characteristics of this equipment. Recommendations are based upon Mil-Std-449B whose test procedures are followed where they are applicable to the AN/CPN-4 Radar System. (Author)

AD-430 013 Div. 19, 12
OTS price $2.50

Kearfott Co., Inc., Little Falls, N. J.
DESIGN, FABRICATION, AND TEST OF A FEASIBILITY-MODEL RELATIVE STAR-ANGLE COMPARATOR.
Final rept.,
by P. Gevas, J. Abate and G. Gulbenkian. May 63
108p.
Contract AF33 657 7997, Proj. 4200, Task 420005
ASD TDR63 586 Unclassified report

Descriptors: (*Star trackers, Optical instruments), (*Space navigation, Star trackers), Celestial navigation, Satellite attitude, Attitude control systems, Optical equipment, Reticles, Photomultipliers, Optical tracking, Models (Simulations) Tests, Manufacturing methods.

A new and unique aerospace vehicle attitude system, designed around the Star-pair Angle Comparator, is described. The system basically measures the direction to any three of the 50 brightest stars, computes the angles between them and processes the information to provide a two-star identification and a highly accurate spatial attitude determination. System operation and performance are discussed along with a detail description of the feasibility model subsystems and their components. It is shown that the optical-electrical subsystems provide an equivalent startracker accuracy within ten arc seconds. The overall system accuracy, including scanner, gimballing and electronics, exceeds contractual requirements by a factor of two and is 20 arc seconds, demonstrated over-all system error excluding computation error. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-429 407 Div. 20, 14, 17, 8, 32
OTS price $2.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST 71, ABSTRACT NO. 21404 TO 21455, PART I.
Rept. for 1-31 Jan 64.
10 Feb 64, 20p. Accession list 71
Contract AF33 615 1124
Unclassified report

Descriptors: (*Radiation effects, Bibliographies), (*Bibliographies, Radiation effects), (*Bibliographies, Materials), Electronics, Ceramic materials, Metallic textiles, Polymer, Inorganic compounds, Organic materials, Space environmental conditions, Test equipment, Test methods.

AD-429 442 Div. 20, 25
OTS price $4.60

Maryland U., College Park.
ROTATION VIBRATION INTERACTION IN DEFORMED NUCLEI,
by Amand Faessler. Dec 63, 40p. TR345
Contract Nonr179700
Unclassified report

Descriptors: (*Nuclear energy levels; Nuclear spins), Electron transitions, Excitation, Functions, Nuclear energy, Vibration, Rotation, Operators (Mathematics), Quantum mechanics.

Contents: The rotation vibration theory; Classification of diagonalized states; Matrix elements--Multipole operators in collective coordinates; Tables for diagonalized rotation vibration interaction.

AD-429 445 Div. 20, 25
OTS price $1.60

Maryland U., College Park.
NUCLEAR MODELS AND THE OSMIUM ISOTOPES,
by Amand Faessler, Walter Greiner and Raymond K. Sheline. Nov 63, 12p. TR338
Contract Nonr1797 00
Unclassified report

Descriptors: (*Nuclear models, Osmium), Isotopes, Nuclear spins, Nuclear energy levels, Nuclear shell models, Nuclear structure.

AD-429 917 Div. 20
OTS price $14.50

Ionics, Inc., Cambridge, Mass.
REMOVAL OF RADIOACTIVE MATERIAL FROM MILK BY ELECTRODIALYSIS.
Final rept. July 62-Sep 63,
by Edgardo J. Parsi and William B. Iaconelli.
7 Feb 64, 154p.
Contract OCD OS62 206
Unclassified report

Descriptors: (*Electrodialysis, Milk), (*Decomtamination, Milk), Radiological contamination, Tracer studies, Strontium, Iodine, Cesium, Rare earths, Costs, PH, Barium, Lanthnum, Cerium.

The removal of the radionuclide contaminants, barium, cesium, lanthanum, cerium and iodine, from milk by electrodialysis was investigated. As in the ion exchange process, over 90% removal of strontium is obtained when the pH of the milk is adjusted to 5.1 to 5.3, whereas at the normal milk pH poor removal is obtained. At 90% removal of strontium, about 80% of the barium and over 99% of the cesium is removed. Very slight removal of lanthanum and no removal of cerium has been observed. In the decontamination process radioactive ions are purged electrically from the milk through an ion transfer membrane along with other ions normally present in milk into a waste solution. The latter ions are replaced simultaneously through another ion-transfer membrane from an aqueous solution of salts (make-up solution). The salt concentration and composition of the milk can be maintained by controlling the composition and concentration of the make-up solution. Less than 1% of the lactose in the milk was lost to the waste solution. Therefore, the loss of organics from the milk to the waste solution can be assumed to be negligible. (Author)

AD-429 987 Div. 20
OTS price $3.00

Martin Marietta Corp., Baltimore, Md.
THERMIONIC DOUBLE-DIODE PROGRAM.
Final technical rept., 1 Nov 62-30 Nov 63,
31 Jan 64, 205p. Rept. no. MND2945 4
Contract AF33 657 10077, Proj. 8173, Task 817305 20
RTD TDR63 4244 Unclassified report

Descriptors: (*Thermionic converters, Design), (*Diodes, Reactor fuel elements), Flame spraying, Electrical conductance, Temperature, Reactor fuel cladding, Diffusion, Coatings, Cermets, Instrumentation, Thermal diffusion, Ceramic materials, Cesium, Molybdenum, Reactor fuels, Uranium compounds, Oxides, Tests.

Results of an extensive Martin-sponsored research and development program were utilized to evolve the design of a fueled, double-diode thermionic module for out-of-pile testing in a program sponsored by Air Force Systems Command. Two modules, each consisting of two diodes of cylindrical configuration connected electrically in series within a single sheath and utilizing a common cesium reservoir, were fabricated and tested. The emitters were the molybdenum claddings of the UO2-Mo cermet bushings used to represent the nuclear fuel in the module. The two modules were tested for cumulative periods of 330 and 715 hours, respectively, at emitter temperatures between 1500 and 2000 C, and at a spacing of 17 to 18 mils. Output power densities of 1.5 to 6 watts per sq cm were produced under the above conditions. Upon completion of the testing, each of the modules was disassembled and examined. Eight UO2-Mo cermet fuel pellets clad with molybdenum were fabricated for study of materials compatibility problems. Dimensional stability, thermal conductivity, electrical resistivity, UO2 diffusion, and thermionic emission were investigated. An improved fueled thermionic double diode for out-of-pile testing adaptable to in-pile operation was designed. (Author)

AD-430 029 Div. 20
OTS price $3.60

Stanford Research Inst., Menlo Park, Calif.
A METHOD FOR ESTIMATING DEPOSITION PATTERNS OF RADIONUCLIDES IN WORLD-WIDE FALLOUT,
by Carl F. Miller. Sep 63, 30p.
Contract OCD OS62 135, SRI Proj. IMU4021
Unclassified report

Descriptors: (*Radioactive fallout, Distribution), Contamination, Mathematical models, Nuclear explosions, Air burst, Surface burst, Radioactive isotopes, Strontium, Cesium, Zirconium, Troposphere, Stratosphere, Rainfall, Data.

Some of the available reported data and data correlations on world-wide fallout are summarized. An empirical method, based on the reported data, for estimating radionuclide deposition patterns and the deposition rates is presented. The application of the method in computations for assessing the contribution of world-wide fallout to environmental contamination, especially of food crops, in nuclear war studies is outlined. Computer input data for the model are summarized. (Author)

AD-430 098 Div. 20, 2
OTS price $2.60

Hudson Inst., Harmon-on-Hudson, N. Y.
SPECIAL ASPECTS OF ENVIRONMENT RESULTING FROM VARIOUS KINDS OF NUCLEAR WARS. PART II, ANNEX IV. EFFECTS OF THERMONUCLEAR WAR ON WEATHER AND CLIMATE,
by Robert U. Ayres. 8 Jan 64, 27p. Rept. no. HI303RR A IV
Contract OCD OS62 218, OCD Task 3511A
Unclassified report

Descriptors: (*Nuclear warfare, Meteorological Phenomena), Troposphere, Ecology, Climatology, Stratosphere, Ultraviolet radiation, Ozone, Geophysics, Rainfall, Erosion, Disasters, Radioactive fallout, Radiation effects.

AD-430 102 Div. 20
OTS price $4.60

General Dynamics/Fort Worth, Tex.
ENERGY AND ANGULAR DISTRIBUTION EXPERIMENT. VOLUME II. ANGULAR DISTRIBUTION OF FAST-NEUTRON AND GAMMA-RAY NUMBER-ENERGY FLUX FROM SLABS,
by G. T. Western. 30 Sep 63, 49p. Document no. NARF62 16T; FZK9 183 2
Contract AF33 657 7201
Unclassified report

Descriptors: (*Radiation measurement systems, Neutron flux), (*Neutron flux, Radiation measurement systems), Energy, Distribution, Neutron scattering, Geometry, Polyethylene plastics, Lead, Fast neutrons, Dose rate steel, Gamma ray scattering.

An experiment in which a narrow-beam slab geometry was used to project radiation from the Aerospace Shield Test Reactor onto test materials of 3% borated linear polyethylene and of lead was performed at the Nuclear Aerospace Research Facility. Except as noted, measurements for polyethylene and lead were made of (1) the radiation source terms; (2) the flux distribution of thermal and fast neutrons within the test materials; (3) the angular distribution of thermal- and epithermal-neutron flux, fast-neutron dose rate, and secondary gamma rays from the test materials; (4) the reflection of neutrons from 3% borated polyethylene and from steel; (5) the angular distribution of fast-neutron number-energy flux; and (6) the angular distribution of gamma-ray dose rate and number-energy flux resulting from primary gamma rays scattered from the test materials. (Author)

AD-430 126 Div. 20
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE UNIVERSAL UNIT OF RADIATION DOSE,
by V. I. Ivanov. 30 Dec 63, 10p.
FTD TT63 1050 Unclassified report

Trans. from Ob Universal'noy Edinitse Radiatsionnoy Dozy, Symposium on Biological Effects of Neutron Irradiations, SM-44/60, pp. 7-11, Oct 63.

Descriptors: (*Radiological dosage, Standardization), Mathematical analysis, Dose rate, Theory, Radiobiology.

AD-430 158 Div. 20, 27, 7
OTS price $8.10

Dynatech Corp., Cambridge, Mass.
NIKE X CONVENTIONAL AND NUCLEAR STEAM POWER SYSTEMS STUDY. VOLUME III. AVAILABILITY EVALUATION,
by C. J. Oberhauser, P. Goldberg and E. F. Frankel. Jan 64, 82p. Rept. no. 434
Unclassified report

Subcontract to Stone and Webster Engineering Corp., Boston, Mass., Contract DA49 129ENG519.

Descriptors: (*Nuclear power plants, Launching sites), (*Steam power plants, Launching sites), Guided missiles (Surface-to-air), Failure (Mechanics), Malfunctions, Programming (Computers), Digital computers, Nuclear reactions, Blast, Thermal radiation, Mathematical models, Electric power production.

This document reports the results of an availability analysis of nuclear and conventional steam power plants proposed for NIKE-X missile bases. The general concept of availability is explained and discussed. The report also explains the method used to analyze the availability of a number of nuclear and conventional steam plants. Calculated values are given with respect to the power requirements of the NIKE-X system. Recommendations for further studies are also included. (Author)

AD-430 342 Div. 20
OTS price $1.60

Aerospace Information Div., Washington, D. C.
SOVIET HEAVY-WATER RESEARCH REACTOR TVR.
Rept. no. 10.
21 Jan 64, 12p.
AID P64 4 Unclassified report

Descriptors: (*Heavy water reactors, Design), Cooling, Construction, Research reactors, Reactor fuel elements, Reactor cores, Reactor reflectors, Reactor shielding materials, Reactor coolants, Neutron flux, Reactor safety systems.

The report presents a detailed description of the TVR reactor. The presentation includes background information, design features, reactor parameters, and information on experimental facilities afforded by the reactor. Illustrations are also included. (Author)

AD-430 603 Div. 20
OTS price $4.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
GAMMA-RAY STREAMING THROUGH DUCTS,
by C. M. Huddleston and W. L. Wilcoxson.
6 Feb 64, 45p.
Proj. Y F008 08 05 201
NCEL R289; DASA 11 026 Unclassified report

Descriptors: (*Ducts, Gamma rays), (*Gamma rays, Shelters), Duct inlets Orifices, Albedo, Dose rate.

A survey is presented of the current status of experimental and theoretical investigations of the problem of gamma-ray streaming through air ducts in concrete. Data are tabulated and plotted for a variety of experiments. Comparisons are made between theory and experiment, inconsistencies are pointed out, and areas needing further investigation are indicated. (Author)

AD-430 627 Div. 20
OTS price $1.10

Stevens Inst. of Tech., Hoboken, N. J.
ANALYSIS.
Annual summary rept. for period ending 30 Nov 63, by T. Huetter, E. L. Koller, S. Taylor, P. Stamer and J. Grauman. Nov 63, 9p. Rept. no. P118 1 64
Contract Nonr306600
Unclassified report

Paper presented before the American Physical Society, Bull. Am. Phys. Soc. 9, 23 (1964).

Descriptors: (*K mesons, Detection), Pions, Analysis, Bevatrons.

AD-430 654 Div. 20, 8, 12
OTS price $11.50

Hughes Aircraft Co., Fullerton, Calif.
TRANSIENT GAMMA RADIATION EFFECTS ON ELECTRONIC SYSTEMS.
29 Aug 63, 157p. Rept. no. FR63 17 179
Unclassified report

Suppl. to PMS 53 1 1720.

Descriptors: (*Electronics, Radiation damage), (*Radiation effects, Electronics), (*Electronic equipment, Radiation effects), Gamma rays, Nuclear weapons, Resistors, Transistors, Diodes, Electron tubes, Electric cables, Oscillators, Infrared detectors, Rectifiers, Thin films, Semiconductors, Circuits, Amplifiers, Materials, Theory, Nuclear explosions mathematical analysis.

This document contains a series of summaries of the current state-of-the-art on transient gamma radiation effects on electronics. The state-of-the-art was compiled by the Nucleonics Research Department of the Hughes Aircraft Company for the PHOENIX Project Officer. It contains the present thinking of this department on transient radiation effects. (Author)

AD-430 730 Div. 20, 25
OTS price $1.00

Kiel U. Germany.
NEW METHOD OF MEASURING TRANSITION PROBABILITIES.
Rept. for June 62-June 63,
by F. Karstensen and J. Richter. Jan 64, 26p.
Grant AF EOAR62 114, Proj. 7367, Task 736704
RTD TDR63 4177 Unclassified report

Report on Research On Characterization and Properties of Materials.

Descriptors: (*Atomic energy levels, Probabilities), Electron transitions, Line spectrum, Iron, Measurement, Electron guns, Photomultipliers.

A combination of intensity and lifetime measurement methods for obtaining atomic transition probabilities is described. Lifetime measurement methods are discussed and two experimental arrangements are described. First results of the measurements are given. (Author)

AD-430 750 Div. 20, 17
OTS price $1.60

Naval Research Lab., Washington, D. C.
SYSTEMS AND TECHNIQUES FOR IN-REACTOR TEMPERATURE CONTROL OF NRL IRRADIATION EXPERIMENTS.
Progress rept.,
by J. R. Hawthorne and L. E. Steele. Dec 63, 19p.
Proj. SR007 01 01, Task 0858
NRL MR1486 Unclassified report

Descriptors: (*Test reactors, Temperature control), (*Radiation damage, Steel), Laboratory furnaces, Instrumentation.

The irradiation of metallurgical test specimens in the beam port and fuel core facilities of various nuclear test reactors at temperatures ranging from 200 to 800 F has necessitated the design and development of several temperature control systems. Basic systems which have been employed for the irradiation of relatively massive loadings in the various experimental facilities of the Brookhaven Graphite Reactor and the Oak Ridge Low Intensity Test Reactor are described in detail and reference made to inherent system advantages and limitations. (Author)

AD-430 924 Div. 20, 25
OTS price $4.60

Kjeller Research Establishment (Norway).
MAGNETIC SCATTERING OF NEUTRONS.
Annual technical rept. no. 3, 1 Jan-31 Dec 63.
31 Dec 63, 45p.
Contract DA91 591EUC2796
Unclassified report

Descriptors: (*Inelastic scattering, Neutrons), (*Neutrons, Inelastic scattering), (*Neutron scattering, Mathematical analysis), Magnetic properties, Polarization, Reflection, Mirrors, Surfaces, Vector analysis, Transformations (Mathematics), Operators (Mathematics), Neutron beams, Excitation, Theory, Cobalt, Elastic scattering, Magnetite.

The present paper is the third in a series of annual reports describing the work on magnetic scattering of neutrons at Institutt for Atomenergi, Kjeller, Norway, performed under contract with the U. S. Department of the Army, through its European Research Office. Experiments were carried out with both polarized and unpolarized neutrons. A larger part of them were inelastic scattering experiments, making use of the so-called diffraction method. Of paramount importance to this method is the geometry of the scattering surfaces associated with the inelastic scattering process. A treatment in the density matrix formalism of the scattering of polarized neutrons is reviewed. Special attention is paid to the inelastic scattering by spin waves and by magnetovibrations. The correctness of the formulas derived was demonstrated in some experiments which are described. The problem of how to measure the transverse polarization component of neutrons was investigated theoretically and experimentally. The experiments do not present a complete solution to the problem, the results obtained so far, however, seem promising. (Author)

AD-431 063 Div. 20
OTS price $9.10

Nuclear Defense Lab., Edgewood Arsenal, Md.
ATTENUATION OF FALLOUT RADIATION AS A FUNCTION OF CONCRETE BLOCKHOUSE WALL THICKNESS,
by Murray A. Schmoke and Ralph E. Rexroad.
Oct 63; 103p.
NDL TR43 Unclassified report

Descriptors: (*Radioactive fallout, Shelters), (*Shelters, Radioactive fallout), Thickness, Concrete, Construction, Civil defense systems, Models (Simulations), Shielding, Radiation Monitors, Dose rate.

This experiment was conducted to verify theoretical calculations of wall thickness effect on the shielding characteristics of a concrete blockhouse in a uniformly contaminated fallout field. Two gamma emitters, cobalt 60 and cesium 137, were used to simulate uniform planes of contamination. The dose rates at various locations within blockhouses with wall thickness of 48 psf, 93.7 psf, and 139 psf were measured with ionization-chamber dosimeters. Reduction factors were calculated from the data taken at the center detector positions and compared with reduction factors computed from the theoretical calculations of National Bureau of Standards. Experimental and theoretical reduction factors 3 feet and 6 feet above the center of the concrete blockhouse agreed within ±15% for a uniformly contaminated plane of cobalt 60, and with ±20% for cesium 137. Cobalt 60 and cesium 137 radiation show approximately exponential attenuation of dose rate as a function of wall thickness ranging from 48 to 139 psf for detector heights of 0 (ground level), 3, and 6 feet. (Author)

AD-431 105 Div. 20
OTS price $2.60

California U., Los Angeles.
CALCULATION OF THE TRANSFORMATION MATRIX FOR A CYCLOTRON FRINGE FIELD.
by Arthur C. Paul. Jan 64, 25p. Rept. no. P62
Contract Nonr23344
Unclassified report

Descriptors: (*Cyclotron waves, Magnetic fields), Matrix algebra, Transformations (Mathematics), Differential equations, Ions, Betatrons, Particle accelerators, Particle trajectories.

A Fortran program for the IBM 7090 computer has been written to calculate the optical effect of a cyclotron's fringing field on an extracted negative ion beam. The program is discussed in terms of the first order ion optic theory of S. Penner and applied to the UCLA 50 MeV cyclotron. The program is also applicable to an extracted positive beam. (Author)

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-429 530 Div. 22
OTS price $1.60

Office of Research Analyses, Holloman Air Force Base, N. Mex.
ON A DAMAGE MODEL FOR BOMB ATTACKS UNDER CONSIDERATION OF OVERLAPPINGS,
by Herbert Knothe. Dec 63, 11p.
ORA 63 16 Unclassified report

Descriptors: (*Bombing, Damage), Equations, Probability, Blast, Statistical distributions, Explosion effects, Mathematical models, Hardening, Statistical processes, Integral equations.

The expected damage caused by bomb attacks on large areas is represented as a double integral for any geometrical shape and size of the target under mathematically rigorous consideration of (1) overlappings, (2) the fact that the damage done to a target point is a monotonically decreasing function of the distance explosion-target point, (3) density (weight function), and (4) hardening. (Author)

AD-429 763 Div. 22
OTS price $1.60

California U., Berkeley.
STUDY OF THE DEVELOPMENT AND STABILIZATION OF DETONATIONS.
Final rept., Oct 62-Oct 63,
by A. K. Oppenheim. Oct 63, 11p.
Grant 129 63
AFOSR 64 0123 Unclassified report

Descriptors: (*Detonations, Scientific research), Detonation waves, Shock tubes, Tests, Rotating mirror cameras, Pressure, Dynamics, Schlieren photography, Light, Intensity, Sparks, Electrolytic capacitors, Gases, Measurement.

AD-430 052 Div. 22
OTS price $3.60

Naval Aircraft Torpedo Unit, Quonset Point, R. I.
INSTRUCTIONS FOR INSTALLATION OF SUSPENSION BANDS MARK 78 MOD 0 ON A TORPEDO MARK 46 MOD 0,
by N. M. Southwick. 30 Jan 64, 33p.
NATU TM185 Unclassified report

Descriptors: (*Suspension devices, Aircraft torpedoes), (*Aircraft torpedoes, Suspension devices), (*Instruction manuals, Suspension devices), Installation, Maintenance equipment, Handling.

This preliminary instruction is to be used until final instructions are added to the OP 1207, U. S. Navy Aircraft Torpedoes, Accessories, and Trajectory Data. (Author)

AD-430 228 Div. 22
OTS price $8.10

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
HERO SUPPORTING STUDIES.
Final technical rept.,
by Norman P. Faunce and Paul F. Mohrbach.
30 Sep 63, 89p. Rept. no. F B1980
Contract N178 8102
Unclassified report

Descriptors: (*Explosives initiators, Hazards), (*Exploding wires, Radiation hazards), Ordnance, Igniters, Radiofrequency, Tests, Detonators, Test methods, Radiofrequency power, Electric potential, Measurement.

For the purpose of demonstrating the thoroughness of a HERO testing program for all hot-wire bridged EED's a detailed evaluation of the RF characteristics of the protected model MARK 7 MOD 0 ignition element was performed. It is shown that an estimate of the RF sensitivity is possible from attenuation measurements made on as few as two or three elements. For example, power required to fire at 1 Gc was found to be 17.3 watts, from a 40-element Bruceton test. This represents about a 17 db increase in power over that required to fire using direct current. A power attenuation measurements on one EED at this same frequency was 18.4 db. Preceding these tests of the ignition element were intensive studies of improving RF power measuring techniques. At the higher frequencies where waveguides rather than coax are used, a technique which we have called the voltage min-max method was given considerable study. Measurements of the voltage minimum and voltage maximum of a standing wave in a waveguide permit power flow toward the termination to be determined. Using a precisely adjustable probe we can make measurements in systems with voltage standing wave ratios as high as 100. With increasing VSWR certain precautions are found necessary as a result of supporting theoretical studies. (Author)

AD-430 250 Div. 22
OTS price $1.60

Army Frankford Arsenal, Philadelphia, Pa.
FEASIBILITY STUDY OF AN EXPLOSIVELY ACTUATED FLASH PROTECTION DEVICE,
by F. T. Pisano. Jan 64, 19p.
DA Proj. 5S-2 06 001
AFA R1640 Unclassified report

Descriptors: (*Photoelectric shutters, Explosive actuators), (*Impact flash, Safety devices), Fire control systems, Detonators, Optical instruments, Display systems.

A study was conducted of an explosively actuated optical shutter which would be compatible with a flash protection system. The shutter was to close an optical aperture 6-3/4 in. long by 2-1/4 in. high within a time interval of 480 microseconds. A design was made and two working models and ten shutters were fabricated. A search for the quickest acting detonator was made and resulted in the use of the T20E1 detonator. Preliminary tests were conducted and high speed motion pictures recorded the time and function on film. These tests indicated that a redesigned shutter and housing were required because of structural inadequacies. The next series of tests was conducted with the redesigned shutter and housing. In these tests, the explosive charge was increased in order to attain the specified time. Satisfactory performance was obtained in these tests. (Author)

AD-430 267 Div. 22, 1
OTS price $10.10

Hughes Tool Co., Culver City, Calif.
20MM MK 4 GUN POD RESULTS OF 300,000 ROUND RELIABILITY TEST.
Rept. for 1 Mar 62-1 Feb 63.
1 Feb 62, 130p. Rept. no. 64 2
Contract NOrd19180C
Unclassified report

Descriptors: (*External stores, Reliability), (*Aircraft guns, Aircraft protuberances), Firing tests (Ordnance), Aircraft ammunition, Naval aircraft, Jet bombers, Attack bombers, Tests, Errors, Pneumatic systems, Gun components.

This report summarizes the 300,000 round firing program with the Mk 4 Gun Pod conducted during 1962-63. The purpose of the test was to develop the reliability of the Mk 4 Gun Pod to 85% fireout of 750 rounds loaded per podful. This reliability corresponds to a fireout of 2000 rounds per stoppage. The 300,000 round test described in this report is the second phase in the total program to fire one million rounds to achieve the final reliability of 95% fireout and 7000 rounds per stoppage. The first phase of 50,000 rounds was completed in 1960. The third phase of 250,000 rounds will be completed in December 1963, and the final phase is scheduled for completion by the end of 1964. (Author)

AD-430 495 Div. 22
OTS price $1.10

Bureau of Mines, Pittsburgh, Pa.
SENSITIVITY CHARACTERISTICS OF LIQUID EXPLOSIVE SYSTEMS.
Progress rept. no. 8, 1 Oct-31 Dec 63,
by Charles M. Mason and John Ribovich. Jan 64, 9p.
Unclassified report

Descriptors: (*Explosive materials, Hydrogen peroxide), (*Hydrogen peroxide, Detonations), Mixtures, Sensitivity, Alcohols, Nitroglycerin, Test equipment, Transducer.

During this report period the program was extended and reoriented to include a study on the sensitivity of proposed substitute nitroglycerin casting solvents. Study was continued on the effect of stoichiometry on the sensitivity of the hydrogen peroxide-glycerin system to shock initiation. Threshold gap values were determined for the difference between high and low velocity detonation. An expendable type pressure transducer was investigated as a means of establishing gap testing on a more quantitative basis. (Author)

AD-430 505 Div. 22
OTS price $5.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
EFFECTS OF NOSE SHAPE AND BOATTAIL ANGLE OF STATIC AERODYNAMIC CHARACTERISTICS OF A 105 MM SHELL AT MACH 4.0, 4.5, AND 5.0,
by Robert H. Whyte and Henry E. Hudgins. Jan 64, 48p.
FRL TM1248 Unclassified report

Descriptors: (*Hypervelocity projectiles, Configuration), Aerodynamic characteristics, Hypersonic characteristics, Angle of attack, Rotating bands, Drag.

This report presents the results of wind tunnel tests of 16 proposed hypervelocity 105 mm projectile configurations. The tests were conducted during September 1962 on a 48% scale model at Mach numbers of 4.0, 4.5, and 5.0 in the Ballistic Research Laboratories Tunnel No. 1. Results are presented as plotted data. All the configurations can be made gyroscopically stable; presently available data indicates that they are also dynamically stable. (Author)

AD-430 506 Div. 22
OTS price $1.60

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
PROPAGATION TEST OF PROPOSED EXPLOSIVE TRAIN FOR FUZE, MT, XM563,
by Jack Brothers. Feb 64, 19p.
Proj. 1C542709D367
AED TM1363 Unclassified report

Descriptors: (*Explosive trains, Reliability), (*Time delay fuzes, Explosive trains), Tests, Artillery fire, Projectile fuzes, Temperature.

An explosive train utilizing the M46 Stab Detonator instead of the T37 Stab Detonator was proposed for use with the Fuze, MT, XM563. The fuze will be used with field artillery Beehive type ammunition. Propagation tests were conducted to evaluate the output and establish the reliability of the proposed explosive train. (Author)

AD-430 509 Div. 22
OTS price $2.60

Naval Propellant Plant, Indian Head, Md.
SOME CONSIDERATIONS AND PRESSURE MEASUREMENTS ON SAFETY CONTAINERS DURING AN EXPLOSION - II.
by M. F. Zimmer, A. H. Lepie and L. Asaoka.
31 Jan 64, 29p.
NPP 8455; NavWeps TR136
Unclassified report

Descriptors: (*Explosion effects, Containers), Plastic coatings, Nitroglycerin, Vibration, Acceleration, Photographs, Plastics, Isocyanate plastics, Shock waves, Hazards, Safety devices, Polyethylene plastics, Stresses, Blast, Safety, Laboratory equipment, Pressure, Experimental data, Tests.

Some theoretical reflections of the explosion phenomena on safety containers and the results from approximately 170 test explosions are presented. In particular, the lateral and downward pressure on the wall and the bottom of the container during an explosion is investigated. The bulging of the container during the explosion of varying nitroglycerin loads is measured from photographs taken with a high-speed framing camera. These measurements provide the data to calculate the acceleration of the outer wall. In addition to the safety containers, selected glassware was specially prepared and coated with polyethylene to protect the personnel who were synthesizing hazardous material. These reaction safety containers were tested with several loads of nitroglycerin. The vibrations of the container mass, about 50 kc/sec frequency, were evaluated. (Author)

AD-430 578 Div. 22
OTS price $1.10

Redstone Scientific Information Center, Redstone Arsenal, Ala.
THE SENSITIVITY OF SOME EXPLOSIVES TO A SHOCK WAVE,
by V. S. Ilyukin and P. F. Pokhil. 22 Jan 64, 8p.
RSIC 122 Unclassified report

Descriptors: (*Explosive materials, Shock waves), (*Shock waves, Explosive materials), Sensitivity, Propagation, Explosive materials, Density, Pressure, Tests, Heating, Temperature, Ignition, Detonations, Separation, Test methods, TNT, Nitroglycerin, Experimental data.

Allowed the sensitivity of the explosives to be related directly to parameters of the initial shock wave, which propagated through the inert explosive. Detonations were transferred through copper barriers from one explosive (active) to the other explosive (inert) to determine their sensitivity to shock waves. The process of detonation transfer was photographed by a SFR-camera.(Russian make) to determine the distance from the boundary separating the metal and the inert explosive to the place of origin of the detonation (for opaque explosives, to the place of discharge of the detonation on the surface of the tested charge). The following active explosives were used: TNT, Cyclonite (Hexogen) and TH 50/50 of various densities, 100 mm in length and 40 mm in diameter with plane detonating front. The length of the inert explosive was 50 mm, and the diameter 20 - 30 mm. The thickness of the copper barrier varied from 5 to 30 mm. (Author)

AD-430 700 Div. 22
OTS price $2.60

Army Frankford Arsenal, Philadelphia, Pa.
FIRE CONTROL EVALUATION FOR SS-11/UH-1B WEAPONS SUBSYSTEM,
by K. Raisner. Jan 64, 28p.
AFA MR M64 24 1 Unclassified report

Descriptors: (*Helicopters, Aircraft tire control systems), (*Aircraft fire control system, Helicopters), Sights, Wire guidance, Antitank ammunition, Guided missiles (Surface-to-surface), Army, Yaw, Pitch (Motion), Design, Tests, Kill probabilities, Experimental data, Fire control systems, Gimbals.

An evaluation of three sighting systems for use with the helicopter mounted SS-11/UH-1B weapons subsystem is presented. The sighting systems evaluated are a Foreign Sight, a Head Mounted Sight and a Gimbal Mounted Sight. The latter two sights were developed under contract to Frankford Arsenal. The evaluation demonstrates that the Gimbal Mounted Sight is the most desirable of the three sighting systems considered. The future use of the Gimbal Mounted Sight as a possible replacement for the XM55, which is now used with the SS-11 system, must await the outcome of further test firings. (Author)

AD-430 806 Div. 22, 16
OTS price $.50

Brigham Young U., Provo, Utah.
CLOSE-IN EFFECTS OF AN UNDERGROUND NUCLEAR DETONATION ON SMALL MAMMALS AND SELECTED INVERTEBRATES.
Final rept.,
by Donald M. Allred, D. Elden Beck and Clive D. Jorgensen. 1 Jan 63, 28p. Rept. no. PNE226F
Proj. 62 87
Unclassified report

Report on Project SEDAN, Nevada Test Site, July 6, 1962.

Descriptors: (*Nuclear explosions, Animals), (*Underground explosions, Animals), Mammals, Radiation measurement systems, Detonations, Analysis, Design, Dosimeters.

AD-431 199 Div. 22
OTS price $4.50

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
PENETRATION OF STRUCTURES BY HYPERVELOCITY PROJECTILES,
by J. F. Heyda and T. D. Riney. Feb 64, 45p.
Rept. no. 64SD3
Contract AF04 694 222
Unclassified report

Descriptors: (*Hypervelocity projectiles, Penetration), (*Penetration, Structures), Mathematical models, Cratering, Partial differential equations, Guided missiles, Vulnerability, Hydrodynamics, Models (Simulations), Programming languages, Equations, Shock (Mechanics), Impact shock, Propagation, Pressure, Aluminum, Iron, Lead, Equations of state, Velocity, Data, Metal plates, Terminal ballistics.

During the early stages after impact by a hypervelocity projectile, the cratering process in the target is very nearly governed by the hydrodynamic model except near the edge of the forming cavity. A mathematical model, supported in detail by numerical solutions of the defining partial differential equations, is valid at all axial positions of the peak pressure pulse beyond that point where this pulse is first attenuated by edge rarefaction fronts proceeding from the projectile periphery from the moment of impact. This point occurs a fraction of a microsecond after impact. A detailed study of various impacting metals is made and the theory presented here shows that in the hypervelocity regime a thick target sees no essential difference between geometrically similar projectiles of like material impacting at a given kinetic energy. (Author)

23. PERSONNEL AND TRAINING

AD-429 383 Div. 23, 22, 30
OTS price $1.10

Marine Corps. Landing Force Development Center, Quantico, Va.
EVALUATION OF COMBAT RIFLEMAN ENVIRONMENTAL TRAINING RANGE.
1963, 8p.
Proj. 31 62 02

Unclassified report

Descriptors: (*Ranges (Establishments), Firing tests (Ordnance)), (*Firing tests (Ordnance), Ranges (Establishments)), Marine Corps, Models (Simulations), Small arms, Military training, Military requirements, Artillery, Automatic weapons, Simulation, Targets, Standards, Feasibility studies.

It was concluded that: (1) The subject range is not suitable for Marine Corps-wide use but the concept can be adapted to various terrain and tactical situations determined suitable and desirable by local commanders; (2) It is not practical nor economical to consider the subject range a standard supply package. However, the following component parts can be made available through the present supply system: (a) Target Device 3-C-52b; (b) Machine Gun Simulator 3-C-65c; (c) Artillery Simulator M17A1; and (d) Type E or F Silhouette Targets. This range is not considered to be readily adaptable to a uniform scoring system for use in an annual or bi-annual qualification course. This combat range simulates realistic battle conditions to a sufficient degree to warrant the expense involved in installing the simulators used. This combat range is not suitable for transition firing as a followup to known distance marksmanship training. This combat range is considered an excellent range for small unit problems in attack and defense. Further testing of the subject range is not desirable nor necessary. (Author)

AD-430 755 Div. 23, 1
OTS price $5.60

Winzen Research, Inc., Minneapolis, Minn.
REPORT ON LOW LEVEL BALLOON PILOT TRAINING AND QUALIFICATION FLIGHTS,
by J. R. Nelson. 14 Feb 64, 51p. Rept. no. 1282R
Contract N123 61756 32762A

Unclassified report

Descriptors: (*Pilots, Flight testing), (*Balloons, Training), (*Pilots, Balloons), Balloon equipment, Naval personnel, Naval aviation, Operation, Performance tests, Safety harness, Pilot seats.

A series of low level balloon pilot training flights were conducted for the U.S. Naval Missile Center and the Office of Naval Research. The objective of the program was to qualify and obtain FAA Licenses for Navy personnel as free balloon pilots. The operation was conducted in the Minneapolis area between 15 May and 30 May 1963. Three flights were conducted using the Winzen Research Inc. Skycar II and one operation using one man jump balloon harness and seat. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-429 504 Div. 24, 2
OTS price $4.60

Advanced Electronics Center, General Electric Co., Ithaca, N. Y.
RESEARCH AND DEVELOPMENT OF AIRBORNE THERMOPLASTIC REAL-TIME RECORDER-DISPLAY.
Interim engineering rept.
Feb 64, 43p.
Contract AF33 657 11101
Unclassified report

Descriptors: (*Recording systems, Thermoplastics), (*Aerial reconnaissance, Recording systems), Mapping, Real time, Display systems, Resolution, Electron beams, Airborne, Electronic equipment, Optical equipment components.

Efforts were directed toward several preliminary investigations conducted on specific thermoplastic recorder-display system problems; and presents an overall system design, and an electrical, optical, and mechanical system specification. Several investigations were carried out to permit defining the system performance characteristics, and to isolate and resolve any problem areas. The principal investigations were concerned with: (1) Optical design, (2) Dynamic range and transfer function of thermoplastic tape, and (3) Line scan integration. Additional investigations were conducted on the airborne vacuum system, the electron gun, and the tape transport design. Although many of the technical areas considered in these studies are interrelated, the studies are presented separately for the purpose of clarity. (Author)

AD-430 033 Div. 24
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEW WARES (SELECTED ARTICLES).
7 Jan 64, 5p.
FTD TT63 1074 Unclassified report

Trans. from Novyye Tovary, no. 8, p.4, 1959.

Descriptors: (*Cameras, Photographic equipment), Photographic lenses, Telephoto lenses.

Brief descriptions are given of the Mir camera and the photographic objectives Telemar-22, Tair-11, and Yupiter-6.

AD-430 042 Div. 24, 12
OTS price $8.10

RCA Service Co., Inc., Patrick Air Force Base, Fla.
PHOTOGRAMMETRIC DATA REDUCTION ANALYSIS.
GENERAL PHOTOGRAMMETRIC ADJUSTMENT,
by George H. Rosenfield. Oct 63, 81p. Technical rept. 75
Contract AF08 606 5300
AFMTC TDR63 9 Unclassified report

Descriptors: (*Guided missile trajectories, Photogrammetry), (*Photogrammetry, Guided missile trajectories), Mathematical analysis, Geodesics, Position finding, Matrix calculus, Analysis of variance, Least squares method, Optical tracking, Optical sights, Errors.

The general photogrammetric adjustment presented in this development is an application of the classical solution of the adjustment of indirect observations with condition equations by the method of least squares. The general solution will simultaneously solve the problems of orientation, space resection, and triangulation. Special case applications will solve independently for specific parameters, the others being assumed to be known. The most important consideration of the general photogrammetric adjustment is its rigorous propagation of given errors in the variables into the general covariance matrix of the adjusted parameters. (Author)

AD-430 242 Div. 24
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
MINIATURE PHOTOGRAPHIC APPARATUS,
by D. Bunimovich. 17 Dec 63, 4p.
FTD TT63 1073 Unclassified report

Trans. from Novyye Tovary No. 7, p. 6, 1959.

Descriptors: (*Photographic equipment, Design), Cameras.

AD-430 281 Div. 24
OTS price $11.50

Eastman Kodak Co., Rochester, N. Y.
A STUDY OF IN-FLIGHT FILM PROCESSING TECHNIQUES.
Final rept., June 62-Nov 63,
by F. H. Jackson and K. R. Scribner. Jan 64, 158p.
Contract AF33 657 8834, Proj. 6237, Task 623701
RTD AL TDR64 6 Unclassified report

Descriptors: (*Photographic processors, Airborne), (*Aerial photographs, Processing), Photographic reconnaissance, Film driers, Performance tests, Models (Simulations), Photographic images, Photographic film, Photographic emulsions, Photographic chemicals, Packing materials, Sealing compounds, Test methods, Tests, Diffusion, Motion picture film.

A study of in-flight film processing techniques was made in relation to the aerospace needs of the U. S. Air Force. The application of the Kodak Bimat Process, a form of diffusion transfer process, to these needs provided a distinct and important improvement in in-flight processing techniques. Further study of different forms of the Process led to the adoption of the one-minute form of the Bimat Process which provides access to a positive image in 60 seconds. A completely processed negative is available in five minutes. The processed films provide positive and negative images of high quality which meet the required photographic characteristics. Some of the design goals have been exceeded; a close approach has been made to others. With only modest post processing treatment, the negative is rendered archival and the positive is of commercial quality. The keeping properties of presoaked Bimat Film were investigated. A Breadboard Mock-up Presoaker and packaging equipment have been built for this purpose. (Author)

AD-430 702 Div. 24
OTS price $1.60

Naval Training Device Center, Port Washington, N. Y.
STUDY, MTMS, STEREO INPUT,
by Martin C. Stark and Leonard Cahn. Jan 64, 8p.
Unclassified report

Descriptors: (*Photographic analysis, Optical scanning), Optical equipment, Digital recording systems, Photogrammetry, Pattern recognition, Stereoscopic photography, Aerial photographs, Automatic, Density, Simulation, Magnetic tape.

A study was made to evolve a density pattern recognition and correlation system that will be capable of scanning stereo aerial photographic information, digitizing this information, and then translating it into elevation profiles. The report presents the techniques employed, which include the scanning system developed, the method of quantizing densities, and recording the pictorial information digitally on magnetic tape. Also presented are some digital pictorial printouts obtained from machine processing of the originally scanned pictorial information. Future work on this program will include further analysis and evolution of a logical scheme for handling density sequences to convert the scanned stereo pair data into elevation profiles; with this information and an x-y plotter, contour lines will be plotted automatically. (Author)

AD-430 810 Div. 24, 18, 1
OTS price $2.60

Aeronautical Photographic Experimental Lab., Naval Air Development Center, Johnsville, Pa.
RECOMMENDATION FOR FORWARD FIRING CAMERA FOR THE RF-8A AIRCRAFT.
Final rept.
Jan 64, 22p.
NADC AP 6321 Unclassified report

Descriptors: (*Aerial cameras, Jet fighters), (*Jet fighters, Aerial cameras), Feasibility studies, Aerial reconnaissance, Photographic reconnaissance, Flight testing, Design, Effectiveness, Performance (Engineering), Reconnaissance planes.

Through installation in Station No. 1 and subsequent flight tests, the APEL has evaluated the suitability of available camera equipment for forward firing use in the RF 8A aircraft. The installed camera equipment included the 3 inch and 6 inch CAX-12 cameras, the KA 45 and the KA 46 cameras, the 4 1/2 inch x 4 1/2 inch format Omera 30 camera, the Omera 30 camera reconfigured by J. A. Maurer to provide a 2 1/2 inch x 4 1/2 inch format and the CAX-3 camera equipped with an improved lens. In concurrence with VFP-62, the APEL recommends the current use of the KA 45 camera. In addition, the APEL recommends some design refinements to the installation proposed by VFP-62. New design requirements were recommended to replace those originally embodied in the prototype development of the CAX 3 camera. (Author)

AD-430 942 Div. 24, 2
OTS price $9.60

Perkin-Elmer Corp., Norwalk, Conn.
RESEARCH IN AUTOMATIC BALLOON INSTRUMENTATION FOR SELENODETIC MAPPING PHOTOGRAPHY.
Final rept.
20 Feb 64, 119p.
Contract AF19 628 2396, Proj. 7600, Task 760007
ARCRL 64 201 Unclassified report

Descriptors: (*Moon, Topographic cameras), (*Astronomical cameras, Airborne), Feasibility studies, Automatic, Balloon equipment, High altitude, Design, Optical equipment components, Photographic equipment, Photographic plates, Telescope lenses, Surface targets, Resolution, Calibration, Target discrimination, Target recognition, Camera shelters, Optical scanning.

A study was conducted to determine the feasibility of an automatic balloon-borne selenodetic plate camera for high-resolution photography of the moon. The areas of investigation include the optical system, system configuration, system stabilization, photographic materials, plate camera arrangement and operation, plate calibration, possibilities for improved resolution, and estimated system performance. Diagrammatic arrangements of the system are provided. Studies indicate that low-contrast lunar details having dimensions exceeding 1000 feet can be recorded photographically by working at the f/20 focal plane of a 36-inch telescopic optical system. The optical form will be similar to that employed in Stratoscope II. Study results indicate the desirability of incorporating ground-controlled acquisition and automatic tracking of the lunar surface. It is concluded that an automatic balloon-borne selenodetic plate camera system is feasible. In preliminary exploration of the moon, selenodetic photography is useful for identifying areas suitable for detailed investigation prior to unmanned and manned landings. The system, if flown outside most of the earth's atmosphere, would be capable of routinely producing lunar photographs with resolutions which have not been obtained from terrestrial observing sites. (Author)

AD-430 963 Div. 24, 25
OTS price $1.10

Aeronautical Photographic Experimental Lab., Naval Air Development Center, Johnsville, Pa.
APPLIED RESEARCH AND INVESTIGATION OF COMPONENTS, EQUIPMENT AND SYSTEMS OF 70MM AERIAL PHOTOGRAPHY TO DETERMINE PERFORMANCE CRITERIA FOR RECONNAISSANCE PURPOSES.
Interim rept.
10 Jan 64, 10p.
NADC AP6403 Unclassified report

Descriptors: (*Aerial cameras, Photographic lenses), (*Photographic lenses, Resolution), Aerial reconnaissance, Military requirements, Tests, Performance (Engineering), Acceptability.

Resolution performance tests are reported of protype lenses which provide high resolution at relatively wide apertures. Four of the lenses cover the 70mm format and one covers the 4 1/2 x 4 1/2 in. format. (Author)

AD-430 997 Div. 24
OTS price $1.60

Aeronautical Photographic Experimental Lab., Naval Air Development Center, Johnsville, Pa.
DESIGN AND FABRICATION OF ADAPTER BOX FOR INSTALLATION OF KA-40A/46A AERIAL CAMERAS IN THE F8U-1P AIRCRAFT.
Final rept.
6 Jan 64, 10p.
NADC AP 6401 Unclassified report

Descriptors: (*Jet fighters, Aerial cameras), (*Aerial cameras, Naval aircraft), Photographic equipment, Design, Control systems, Mounting brackets, Installation, Flight tests, Acceptability.

Modification is described of the Navy camera control system-4 (NCCS-4) of the RF-8A aircraft to control the KA40A/45A/46A cameras in stations 3 and 4, which extends the aircraft photographic reconnaissance capability as accomplished under Amendment 118. The APEL designed and fabricated a prototype NCCS-4 camera control system modification kit and a prototype rotatable mount modification kit. Production quantities of the rotatable mount kit were fabricated by the APEL. Chicago Aerial Industries produced the NCCS-4 camera control system modification kit. The changes to the control system and the rotatable mount were found to be satisfactory. (Author)

Division 25 - PHYSICS

25. PHYSICS

AD-429 354 Div. 25
OTS price $8.60

Madrid Univ. (Spain).
STUDIES ON THE COOPERATIVE PHENONMENON OF X - RAY CRITICAL SCATTERING NEAR PHASE TRANSITIONS IN SOLIDS.
Final tech. rept., 1 Dec 62-30 Nov 63,
by M. L. Canut. 30 Nov 63, 77p.
Contract DA91 591EUC2755
Unclassified report

Descriptors: (*Ferroelectric crystals, X-ray diffraction analysis), (*Sodium compound, Nitrites), Crystal structure, Single crystasl, Nitrates, Symmetry (Crystallography), Diffusion, Scattering, Polarization, Solids.

The disorder of the paraelectric phase of NaNO2 has been evidenced from the existence at about 185 C of x-ray diffuse scattering sheets normal to the polar axis. It has been shown that these sheets can be explained as arising from long small domains (so called cigarrillos) of about 30 A with ferroelectric structure statistically oriented parallel or antiparallel to the polar axis. This positional disorder alone with correlations cannot explain the observed diffuse scattering sheet near to the 002 reflection, even if correlated librations are introduced. Calculations and Fraunhoier patterns of two dimensional models with statistical point structures prove that the domains oscillate parallel to the polar axis as rigid entities. Much of the analysis has been carried out with the help of the Q-function calculated and experimentally produced with a two-dimensional folding machine. (Author)

AD-429 355 Div. 25, 9, 4
OTS price $3.60

AeroChem Research Labs, Inc., Princeton, N. J.
TRANSPIRATION COOLING WITH CHEMICAL REACTIONS,
by Daniel E. Rosner. Jan 64, 33p. Rept. no. TP-79
Contract AF49 638 1138
Unclassified report

Descriptors: (*Cooling, Thermochemistry), (*Boundary layer, Cooling), (*Coolants, Thermochemistry), Heat transfer, Gas flow, Laminar boundary layer, Turbulent boundary layer, Ammonia, Hydrogen, Water, Hydrazine, Liquid rocket fuels, Reaction kinetics Mathematical analysis.

Transpiration coolant requirements are examined for gas/solid systems in which the thermal effects of chemical reactions must be taken into account. For example, a coolant may undergo phase change and chemical decomposition in passage through the wall itself. This would alter the effective heat absorption capability and the mean molecular weight of the effluent gas. Further chemical reaction may occur when the coolant vapors (or decomposition products) mix with the hot gases in the boundary layer. In general, both processes will influence the amount of coolant required to maintain a prescribed surface temperature, and therefore significantly alter the relative merits of possible coolants. As such, thermochemical effects are of great practical interest. Simple computational techniques and numerical examples are given herein, together with a discussion of several factors governing the rates of these chemical reactions. (Author)

AD-429 381 Div. 25
OTS price $4.60

Syracuse U, N.Y.
SUBMILLIMETER MASER INVESTIGATIONS WITH RUBY.
Technical rept., 1 Jun 62-31 Dec 63,
by G. K. Wessel. 31 Dec 63, 48p.
Contract Nonr66918
Unclassified report

Descriptors: (*Masers, Ruby), (*Millimeter waves, Electromagnetic pulses), Absorption, Xenon lamps, Measurement, Relaxation time, Phototubes, Atomic energy levels, Mirrors, Interferometers, Crystal lattices.

AD-429 408 Div. 25
OTS price $3.60

Yale U. Observatory, New Haven, Conn.
BREMSSTRAHLUNG CROSS SECTIONS IN THE NEIGHBORHOOD OF THE PLASMA FREQUENCY,
by Ludwig Oster. Nov 63, 26p.
Contract AF33 657 7271, Proj. 7073, Task 707301
ARL 63 209 Unclassified report

Research on Particle Dynamics.

Descriptors: (*Bremsstrahlung, Plasma physics), (*Plasma physics, Bremsstrahlung), Frequency, Emissivity, Photons, Electromagnetic waves, Orbital trajectories, Particles, Electrons, Ions, Probability, Direct current, Acceleration.

The spontaneous emission probability due to the bremsstrahlung mechanism for photons whose frequencies are close to the plasma frequency is computed on the basis of classical radiation theory. The particle orbits are calculated using for the interaction potential electron-ion a Coulomb form which is cut off at the Debye distance. The resulting emission probability undergoes a rapid, smooth transition at frequencies close to the plasma frequency from the logarithmic frequency dependence, typical of the high frequency limit, to the frequency-idependent expression, derived in the d.c. limit. For practical purposes, shielding corrections can be neglected in computing the Fourier components of the acceleration, but must be applied for frequencies in the neighborhood of the plasma frequency, when the spectrum is averaged over collision parameters. (Author)

AD-429 412 Div. 25
OTS price $2.60

Barus Research Lab. of Physics, Brown U., Providence, R. I.
STUDY OF SURFACE PROPERTIES OF ATOMICALLY-CLEAN METALS AND SEMICONDUCTORS.
Progress rept. no. 4, 1 June-31 Dec 63,
by H. E. Farnsworth and B. D. Campbell. Dec 63, 14p.
Contract DA36 039sc89069, DA Proj. 3A99 25 001
Unclassified report

Descriptors: (*Cadmium compounds, Surface properties), (*Semiconductors, Electron diffraction analysis), Cleaning, Sulfides, Single crystal, Etched crystals, Adsorption, Oxygen, Heat treatment.

The (0001) Surfaces of CdS were examined by means of Low-Energy Electron Diffraction. Heating the CdS crystal in oxygen at 200C induces adsorption on the (0001) SPECULAR surface. The (0001) MATTE surface of a high purity CdS crystal was examined. The results for this crystal showed the presence of surface planes in agreement with the results for the same face of another CdS crystal whose purity was unknown. The (0001) MATTE surface of a high purity CdS crystal was prepared

for examination without chemical etch and without exposure to temperatures higher than 400C. A weak diffraction pattern characteristic of diffraction from a (0001) plane and containing half integral as well as integral order beams in two major azimuths was obtained in agreement with the results for the (0001) SPECULAR surface. These results show that the chemical etch exposes the planes on the MATTE surface. Heating the crystal near 500C in a vacuum caused the appearance of planes as in the case of the chemical etch. Thus the plane on the MATTE surface is unstable under the conditions of chemical etch or heat treatment near 500C in a vacuum. (Author)

AD-429 414 Div. 25, 8
OTS price $4.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
PHONON INTERACTIONS IN CRYSTALS.
Quarterly progress rept. no. 2, 15 Aug-14 Nov 63, by A. H. Nethercot, N. S. Shiren and M. Pomerantz. 14 Nov 63, 38p.
Contract DA36 039AMC02280E
Unclassified report

Descriptors: (*Phonons, Ultrasonic properties), (*Transducers (Acoustics), Sound generators), Crystals, Masers, Sound transmission, Parametric amplifiers, Attenuation, Semiconductors, Magnesium compounds, Oxides, X-band, Quartz, Germanium.

From the high efficiency of the parametric upconversion process previously reported, it appeared that parametric amplification of X-band acoustic signals should be observable. Such parametric down-conversion and amplification has now been achieved. A pump signal at 16.45 Gc/sec was introduced into a magnesium oxide rod, and a gain of one db/cm was observed at frequencies near 8.5 Gc/sec. This gain was limited only by the amount of pump power that the 16.45 Gc/sec cavity would accept without breakdown. The upconversion process was verified by bringing the harmonic signal out of the cryostat in the form of electromagnetic energy and directly detecting it. During this investigation, an additional new harmonic generation process has been observed. This process takes place at the surface of the quartz transducer and is probably caused by a polarization at the surface proportional to the square of the elctric field. This process does not depend on the piezoelectricity of the quartz and should be present in all materials in varying degrees. (Author)

AD-429 438 Div. 25
OTS price $1.10

Air Force Cambridge Research Labs., Bedford, Mass.
ION DISSOCIATION IN THE DRIFT TUBE OF A TIME-OF-FLIGHT MASS SPECTROMETER: IV. SPURIOUS FRAGMENT PEAKS ORIGINATING FROM NORMAL IONS HEAVIER THAN THE DISSOCIATING PARENT ION,
by W. W. Hunt, Jr. and M. J. Kennedy. Dec 63, 5p.
AF Proj. 7635
AFCRL 63 926 Unclassified report

Descriptors: (*Ions, Dissociation), (*Mass spectroscopy, Spectrum analyzers), Instrumentation, Electrometers, Functions, Detectors, Particle beams, Time.

The drift tube of a time-of flight mass spectrometer can be used as the reaction chamber for kinetic studies of ion dissociation reactions. When the instrument is used in this way, interpretation of the results can be seriously affected by spurious fragment peaks that do not represent products of the ion dissociation reaction being studied. When the fixed delta method of identifying dissociation products is used, spurious fragment peaks originating from normal ions whose unretarded and shifted flight times lie between the unretarded and shifted flight times of the parent ion are particularly troublesome. The ions responsible for such peaks can, however, be identified by means of the flight-time shift equations, which can also be used to predict the retarder voltage Vrf which a particular ion will appear as a spurious fragment peak. (Author)

AD-429 443 Div. 25
OTS price $2.60

Maryland U., College Park.
PHOTONUCLEAR REACTIONS IN A UNIFIED THEORY,
by W. M. MacDonald. Dec 63, 19p. TR343
Contract Nonr1797 00
Unclassified report

Descriptors: (*Photonuclear reactions, Theory), Resonance, Nuclear reactions, Analysis, Mathematical models, Structural shells, Functions, Nucleons, Nuclei, Experimental data, Interference, Emissivity, Light.

Photonuclear reactions are treated within the framework of the unified theory presented in earlier papers. The transition amplitude is the sum of a nonresonant direct transition matrix element and a resonant compound nuclear term, determined by an effective interaction. The difficulties associated with the use of virtual states are discussed and resolved. (Author)

AD-429 444 Div. 25
OTS price $1.60

Maryland U., College Park.
THE GAMMA-ABSORPTION CROSS SECTION OF HOLMIUM IN THE DYNAMIC COLLECTIVE THEORY,
by Michael Danos and Walter Greiner. Nov 63, 9p. TR310
Contract Nonr1797 00
Unclassified report

Descriptors: (*Holmium, Nuclear cross sections), Gamma-ray absorption coefficients, Proton cross section, Excitation, Quantum mechanics, Absorption, Nuclear resonance.

AD-429 464 Div. 25
OTS price $9.10

Coordinated Science Lab., U. of Illinois, Urbana.
A STUDY OF THE PROJECTIONS ON ELECTRODES AND THEIR EFFECT ON ELECTRICAL BREAKDOWN IN VACUUM,
by Harry E. Tomaschke. Jan 64, 104p. Rept. no. R192
Contract DA36 039AMC02208E, Proj. 3A99 25 004
Unclassified report

Descriptors: (*Electrodes, Electric arcs), (*Field emission, Electrodes), Vacuum, Electric fields, Cathodes, Electric discharges, Surfaces, Surface properties, Electric currents, Heaters, Vacuum apparatus.

Recent studies of electrical breakdown in clean vacuum systems indicate that breakdown is initiated by field emission current and occurs at a value of the electric field which is approximately a constant independent of the electrode geometry and the spacing between the electrodes. It has been postulated that sharp projections on the cathode cause a local enhancement of the electric field and hence almost all

of the field emission current is emitted form these projections. The present investigation was undertaken to investigate the characteristics of projections that exist on electrode surfaces and to determine the correlation between the geometry the projections and the prebreak-down current-voltage characteristics of the electrodes. Fowler-Nordheim plots of the prebreadkdown currents predicted that the projections should be of the order of 10 to the minus 4 power to 10 to the minus 5 power cm in diameter and have a length about ten times the diameter. Direct observations of electrode profiles with an electron microscope confirmed that projections of the predicted size and shape did exist on the electrode surface. Electrical breakdown resulted in the disappearance of one or more projections and sometimes caused the formation of new projections. (Author)

AD-429 465 Div. 25, 15
OTS price $4.60

Stanford U., Calif.
LARGE-SAMPLE ESTIMATION OF AN UNKNOWN DISCRETE WAVEFORM WHICH IS RANDOMLY REPEATING IN GAUSSIAN NOISE,
by Melvin Hinich. 31 Dec 63, 43p. TR93
Contract Nonr22552, Proj. NR342 022
Unclassified report

Descriptors: (*Noise, Numerical analysis), Series, Polynomials, Communication theory, Inequalities, Probability, Signals, Statistical analysis.

AD-429 486 Div. 25, 17
OTS price $1.60

Illinois Inst. of Tech., Chicago.
X-RAY ABSORPTION SPECTRA OF CU-NI ALLOYS,
by Leonid V. Azaroff and Badri Das. Dec 63, 14p. TR63 1
Contract Nonr1406 07, Proj. NR031 684
Unclassified report

Descriptors: (*X-ray absorption analysis, Alloys), (*Copper, Nickel), Metals, Measurement, Spectrum analyzers, Symmetry (Crystallography), Electron transitions.

Copper and Nickel K absorption spectra have been measured in the pure metals and in four alloys respectively containing 17.2, 26.0, 43.3, and 65.6 at. % copper. Variations in the absorption-edge fine structure of both metals were observed in the nickel-rich solid solutions. These variations are interpreted to indicate progressive sharing of copper 4s electrons with nickel, in accord with the collective-electron model. The specific interpretation of the x-ray spectra, however, requires the consideration of atomic electron configurations as they exist in the crystal field of each alloy. It is also shown that this interpretation can be applied to explain the x-ray emission spectra observed by others. (Author)

AD-429 541 Div. 25
OTS price $3.60

University of Southern Calif., Los Angeles.
KINETIC EQUATIONS OF THE BOGOLYOUBOV THEORY OF CLASSICAL GASES AS DERIVED FROM THE MARKOVIAN VERSION OF THE PRIGOGINE THEORY,
by J. Stecki and H. S. Taylor. 1964, 28p.
Contract Nonr228 23, Proj. NR013 307
Unclassified report

Descriptors: (*Gases, Irreversible processes), (*Irreversible processes, Kinetic theory), Integral transforms, Fourier analysis, Statistical functions, N-body problem, Function, Differential equations.

The Bogolyoubov Theory of irreversible processes in classical gases in the lambda-version and for homogeneous systems is discussed and evaluated within the framework of the Prigogine theory. It is proved that it leads exactly to the Markovian equation for the velocity distribution as derived by Prigogine and Resibois. (Author)

AD-429 544 Div. 25
OTS price $3.60

California U., La Jolla.
A PROOF THAT THE FREE ENERGY OF A SPIN SYSTEM IS EXTENSIVE,
by Robert B. Griffiths. 1 Jan 64, 29p. Rept. no. TR17
Contract Nonr2216 11, Proj. NR017 630
Unclassified report

Descriptors: (*Spin, Energy), (*Energy, Spin), Functions, Theory, Surfaces, Volume, Entropy, Magnetism, Specific heat, Mathematical models, Ferromagnetism, Quantum mechancis, Quantum statistics, Statistical mechanics, Gases.

The free energy obtained from the canonical partition function for a finite spin system possesses a certain convexity property, of which theorems by Peierls and Bogoliubov are particular applications. This property is used in proving the following result; the free energy of a spin system in a regular lattice, divided by the number of spins, converges to a definite limit as the system becomes infinite (in such a way that the surface to volume ratio goes to zero). The limit is not influenced by certain common types of boundary conditions. A similar result, but with convergence understood in a weaker sense, holds for derivatives of the free energy such as entropy, magnetization, and specific heat. In the proof it is necessary to assume that the Hamiltonian has the translational symmetry of the spin system, and that long range interactions decrease sufficiently rapidly with the distance r between spins. (Author)

AD-429 717 Div. 25, 8
OTS price $16.00

Microwave Lab., Stanford U., Calif.
MILLIMETER WAVE GENERATION USING FERROMAGNETIC MATERIALS,
by Georg L. Heiter. Oct 63, 228p. Rept. no. 1090
Contract DA36 039AMC00041E, DA Proj. 1G6 22001A005 05
Unclassified report

Descriptors: (*Millimeter waves, Waveform generators), (*Waveform generators, Ferromagnetic materials), Magnetic fields, Garnet, Pulse generators, Extremely high frequency, Yttrium compounds, Wave guides, Input-output devices, K band, Ferrites.

Generation of millimeter waves with ferromagnetic materials by using pulsed magnetic fields as the energy source is discussed. Two specific types of generators were studied. The first of these two types had been investigated earlier. It utilized an external (low microwave frequency) rf magnetic field applied to a spherica3 yttrium iron garnet (YIG) sample to establish the initial precession angle in a conventional ferromagnetic resonance experiment. The objectives of the further investigation of this scheme were, first, to remove earlier limitations and extend the output frequency to higher ranges, and second, to give an engineering correlation between theoretical and experimental results. This has been accomplished and successful operation of this generator was obtained in the K-band range and V-band range, yielding peak pulsed powers of

about 700 mW and 25 mW, respectively, with pulse widths in the order of 10 nsec in both cases. The second type generator, which uses crystalline anisotropy to achieve the initial precession angle, was originally proposed for cubic materials. In this report a more detailed quasi-static analysis of its operation is presented, together with attempts to verify the performance of this scheme experimentally. (Author)

AD-429 735 Div. 25
OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
STRESS-WAVE PROPAGATION IN ALUMINUM,
by R. N. Waser, J. L. Rand and J. M. Marshall.
11 Mar 64, 27p.
NOL TR63 141, BRR 107 Unclassified report

Descriptors: (*Stresses, Wave transmission), (*Propagation, Theory), (*Aluminum, Impact shock), Shock waves, Elasticity, Plasticity, Errors, Analysis, Velocity, Rods, Reentry vehicles.

The one-dimensional theory of stress-wave propagation has been found to adequately represent a three dimensional experimental situation in both the elastic and plastic regimes. An air gun was used to accelerate a rod and impact it against a stationary test rod to produce a force pulse. The strain resulting from this pulse was recorded at various positions along the test rod. The deviation between the theoretical and experimental values of maximum stress was less than 11.5%. (Author)

AD-429 757 Div. 25
OTS price $5.60

Avco Everett Research Lab., Everett, Mass.
THERMAL CONDUCTIVITY OF ARGON AT HIGH TEMPERATURES,
by M. Camac and R. M. Feinberg. Mar 63, 50p.
Rept. no. RR168
Contracts AF49 638 1129, AF04 694 33
BSD TDR63 250 Unclassified report

Descriptors: (*Thermal conductivity, Argon), (*Heat transfer, Measurement), Shock tubes, High-temperature research, Gas ionization, Plasma medium, Blackbody radiation, Instrumentation, Infrared radiation.

The infrared heat transfer gauge was used for end wall measurements of the convective heat transfer from argon behind the reflected shock. The thermal conductivity of neutral (unionized) argon was measured before the ionization relaxation time, and could be fit with the temperature dependence $T^{(0.76 \pm .03)}$ over the free stream temperature range from 20,000 K to 75,000 K, corresponding to incident shock velocities from 3 to 6 mm/microsec. At later times, after the free stream established equilibrium ionization, the convective heat transfer rate remained the same as the initial neutral argon rate. Theoretical predictions of Fay and Kemp, assuming equilibrium boundary layer conditions, are 20 to 30% below the experimental values. Also reported in this paper are measurements of the ionization times behind the reflected shock, and these are in agreement with an extrapolation of the Petschek and Byron measurements behind the incident shock. There is a discussion of the large changes in the gas conditions behind the reflected shock due to the ionization process. The final equilibrium conditions are reached abruptly, as indicated by the continuum radiation emission with becomes constant immediately after ionization relaxation. (Author)

AD-429 764 Div. 25, 13
OTS price $9.10

Graduate Aeronautical Labs., Calif. Inst. of Tech., Pasadena.
THE BUCKLING OF CLAMPED SHALLOW SPHERICAL SHELLS UNDER UNIFORM PRESSURE,
by Robert Reid Parmerter. Nov 63, 97p.
Rept. no. SM63 53
Grant AF AFOSR352 63
AFOSR 5362 Unclassified report

Descriptors: (*Elastic shells, Buckling (Mechanics)), Structural shells, Pressure, Geometric forms, Copper, Stability, Stresses, Deformation, Mathematical models, Mathematical analysis, Equations, Elasticity.

The problem of the buckling of clamped spherical shells under uniform external pressure is examined. A theoretical study is carried out to determine if asymmetrical modes participate in the snap-through process. It is shown that asymmetrical buckling does occur in a certain range of a geometric parameter, at loads which are significantly less than those predicted from symmetrical theory. Additional effects can be expected if the shell has symmetrical or asymmetrical imperfections, however, the present study considers only the perfect shell. Experiments were carried out with copper shells fabricated by an electroforming process. The initial imperfections in the test specimens were of the order of 1/10 of the thickness. The buckling loads of these shells exeeded the loads which have previously been reported by as much as a factor of two at higher values of the geometrical parameter. Good agreement is found between theory and experiment, and with the recently published asymmetrical theory of Huang. (Author)

AD-429 770 Div. 25, 1
OTS price $3.60

Graduate Aeronautical Labs., California Inst. of Tech., Pasadena.
ON CORRUGATION-STIFFENED PANELS,
by Y. C. Fung. June 62, 28p. Rept. no. SM62 33
Contract AF49 638 220
AFOSR 3122 Unclassified report

Descriptors: (*Panels (Structural), Sheets), (*Stiffened cylinders, Welding), Shear stresses, Stresses, Loading (Mechanics), Vibrations, Difference equations, Partial differential equations, Tests, Aeroelasticity, Spacecraft.

A corrugation-stiffened panel consists of a flat plate and a cylindrically corrugated plate welded together along lines of contact. Such a panel appears on air-and space-craft mainly for its thermal-stress relieving characteristics. In some current publications such a plate is treated as an orthotropic plate. It is pointed out that the ordinary plate theory cannot be applied to the corrugation-stiffened panel, because the basic twisting moment relation, Mxy=Myx becomes untenable. A difference-differential equation is established here for the corrugation-stiffened panel. In an approximation, the difference-differential equation is written as a partial differential equation which has the same form as the orthotropic plate equation. The present theory tells how to interpret the coefficients as related to the plate geometry. Some consequences with regard to the static deflection and vibration modes and frequencies of corrugation-stiffened panels are discussed. If the formula to correct the experimental envelope of

supersonic flutter boundaries given by Kordes, Tuovila, and Guy, is used a somewhat different boundary is obtained but the modification is not large. (Author)

AD-429 772 Div. 25, 30
OTS price $1.60

Hudson, Labs., Columbia U., Dobbs Ferry, N. Y.
MEASUREMENTS OF SOUND VELOCITY MADE WHILE ANCHORED IN THE VIRGIN ISLANDS BASIN,
by Albert N. Guthrie and John D. Shaffer.
18 Sep 63, 15p. Rept. no. CU128 63, TR107
Contract Nonr266 84
Unclassified report

Descriptors: (*Underwater sound, Velocity), Instrumentation, Cavity resonators, Correlation technique, Motion, Measurement.

An NBS velocimeter was used to obtain measurements of the fluctuations in the velocity of sound at three shallow depths in the Virgin Islands Basin. The instrument was suspended from an anchored ship. During one run a simultaneous measurement was made with a resonant-cavity meter. The observed fluctuations are characterized in terms of the coefficient of variation and the autocorrelation function. The method of analysis was designed to reduce the effects of instrument motion upon the result. (Author)

AD-429 781 Div. 25
OTS price $7.60

Adelphi Research Center, Mineola, N. Y.
SIRUCTURE-BORNE NOISE AND RELATED FIELDS OF INTEREST: RECENT WORK AND PROBLEM AREAS,
by Frederick V. Pohle. July 63, 79p. Rept. no. 109
Contract Nonr 3554 01, Proj. NR064 462
Unclassified report

Descriptors: (*Bibliography, Noise), (*Noise, Bibliography), Airplane noise, Elasticity, Strutural shells, Metal plates, Vibration, Sound transmission, Fatigue (Mechanics), Dynamics, Linear systems, Nonlinear systems, Submarine noise, Pipes, Acoustus, Ship noise, Wave transmission, Reports, Elastic shells, Damping, Ship plates, Ship structural components, Shock (Mechanics), Reviews, Textbooks, Numerial methods & procedures, Structures, Ocean bottom, Design, Scattering, Ultrasonic properties, Oceans.

An outline is presented of recent results and problem areas in the field of structure-borne noise and related disciplines. This work will orient those who may become active in this field in the future, and to assist those who are already active in it. The former will become aware of the great diversity of this wide field, and the latter may see new directions for work in their own and related areas. A brief outline of the fifteen sections of the report indicates its scope and limitations. (Author)

AD-429 789 Div. 25, 8
OTS price $4.60

HP Associates, Palo Alto, Calif.
SEMICONDUCTOR MATERIALS.
Interim rept., 27 June-26 Sep 63.
26 Sep 63, 46p.
Contract Nobsr89489, Proj. SR008 0301, Task 9475
Unclassified report

Descriptors: (*Semiconductors, Electroluminescence), (*Electroluminescence, Display systems), Diodes (Semiconduors), Boron compounds, Phosphides, Gallium alloys, Arsenic alloys, Phosphorus alloys, Vapor plating, Crystallization, Crystal growth, Etched crystals, Optical properties.

It is shown that injection electroluminescence in semiconductor diodes is better suited for a solid-state panel display that the ac electroluminescence in ZnS-type powders. The opto-electric criteria of a semiconductor type electroluminescent display matrix and the necessary material selection satisfy them are discussed. The progress on materials and device technology using cubic boron phosphide and GaAs-GaP alloy el diodes is reported. Results of measurements of optical absorption and electroluminescence in BP are described. The range of possible injection el colors is investigated. A solution to the problem of matrix switching and storage is discussed. (Author)

AD-429 795 Div. 25, 6, 2
OTS price $10.10

Avco Marine Electronics Office, New London, Conn.
INSTRUMENTATION FOR SOUND TRANSMISSION MEASUREMENTS.
Final rept.
Dec 63, 120p.
Contract Nonr4085 00
Unclassified report

Descriptors: (*Sound transmission, Measurements), Instrumentation, Signals, Propagation, Noise, Wind, Explosive materials, Calibration, Wire, Hydrophones, Pressure, Geometry, Experimental data, Oceanographic data.

As part of the ONR Acoustic Program in signal processing, it was determined, in the fall of 1962, that certain propagation and ambient noise studies should be conducted in the Tongue of the Ocean. The propagation studies are to establish the deterministic and statistical character of wideband signals traveling isolated and identifiable paths; the noise studies are to establish the statistical character of the wind generated noise at depth. To conduct these studies, it was necessary to obtain a suitable sound source and measuring instrumentation. Section I of this report covers results of investigation into small explosive charges; Section II covers the improvement, reinstallation and calibration of a taut wire hydrophone array in the Tongue of the Ocean. (Author)

AD-429 806 Div. 25
OTS price $2.60

Brown U., Div. of Applied Mathematics, Providence, R. I.
UNIQUENESS THEOREMS IN THE LINEAR THEORY OF ANISOTROPIC VISCOELASTIC SOLIDS,
by W. S. Edelstein and M. E. Gurtin. Feb 64, 26p. Rept. no. TR24
Contract Nonr562 25, Proj. NR064 431
Unclassified report

Descriptors: (*Elasticity, Mathematical analysis), Dynamics, Viscosity, Differential equations, Calculus of variations, Matrix algebra, Potential theory, Integral transforms, Deformation.

Some uniqueness theorems appropriate to dynamic linear viscoelasticity theory (small deformations) are proved. The first theorem asserts that the mixed problem of dynamic viscoelasticity theory has at most one solution provided the relaxation tensor is initially symmetric and initially positive definite. The proof of this theorem uses techniques which were employed by Volterra to establish a similar theorem in quasistatic viscoelasticity. The second result, the proof of

which utilizes the Laplace transform techniques of Breuer and Onat, removes the initial symmetry requirement on the relaxation tensor G. This is done, however, only at the expense of requiring that G be independent of x, and the both G and the solution in question possess a Laplace transform with respect to the time. The third theorem which is the most difficult to prove, says if G is independent of x, initially symmetric, and initially strongly elliptic, then the displacement problem of dynamic viscoelasticity has at most one solution. Notice that if G has the usual symmetries and is initially positive definite, the G is also initially strongly elliptic. In this sense, the third theorem is more general than the first. (Author)

AD-429 830 Div. 25, 2
OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
INFLUENCE OF ATMOSPHERIC TURBULENCE ON THE AUDIBILITY OF SOUNDS IN THE ATMOSPHERE,
by V. V. Bazilevich, Tr. by Ingeborg V. Baker. 17 Jan 64, 9p.
RSIC 121 Unclassified report

Trans. from Trudy Glavnoi Geofizicheskoi Observatorii, 73, pp. 50-53, 1958.

Descriptors: (*Atmospheric motion, Sound transmission), (*Sound transmission, Atmospheric motion), Turbulence, Sound, Attenuation, Sound signals, Atmospheric refraction.

AD-429 831 Div. 25
OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
ANALYSIS OF CONTACT HEAT EXCHANGE,
by Yu. P. Shlykov, E. A. Ganin and N. B. Demkin. 9 Jan 64, 17p.
RSIC 117 Unclassified report

Trans. from Teploenergetika, 7:6, pp. 72-76, 1960.

Descriptors: (*Surfaces, Thermal conductivity), (*Compressive properties, Thermal stresses), Analysis, Heat, Loading (Mechanics), Deformation, Steel.

A method is presented for the theoretical calculation of the magnitude of thermal contact, caused by the resistance of two rough surfaces under various compressive stresses and degrees of surface finish. At high heat currents the thermal contact resistance is essentially expressed by the distribution of temperatures within the bodies in contact. In spite of this, up to the present time generally adopted views concerning the function of the individual components of thermal contact resistance and their dependence upon various factors are nonexistent; the available research data are not generalized and in several cases are inconsistent. In this study an attempt has been made to determine analitically the magnitude of the contact resistance for various conditions of contact. (Author)

AD-429 850 Div. 25
OTS price $1.60

J. G. Engineering Research Associates, Baltimore, Md.
COLLAPSE, BUCKLING AND POST FAILURE OF CYLINDRICAL SHELLS,
by Joshua E. Greenspon. Dec 63, 14p. Rept. no. TR4
Contract DA36 034ORD3081RD
Unclassified report

Descriptors: (*Structural shells, Cylindrical bodies), (*Elastic shells, Deformation), Failure (Mechanics), Stresses, Analysis, Plasticity, Elasticity, Numerical analysis.

It is demonstrated how simple existing theories can predict whether a shell will fail by buckling or form a collapse hinge and then fail by this collapse mechanism. It is also shown how work-energy analysis can predict the post failure plastic deflections of the shell once the mode of failure is known. Some comparisons with experimental results are given. (Author)

AD-429 851 Div. 25
OTS price $2.60

Harry Diamond Labs., Washington, D. C.
EFFECT OF SPACE CHARGE UPON TRANSPORT OF CHARGE CARRIERS,
by A. L. Ward. 15 Jan 64, 26p.
HDL Proj. 96600
HDL TR1195 Unclassified report

Descriptors: (*Space charges, Transport properties), Drift, Diffusion, Electric field, Difference equations, Velocities, Gases, Solid state physics, Electrons, Mobile, Motion, Ultraviolet radiation, Cathodes, Photons, Photoelectric effect.

Numerical machine calculations have been made that determine the effect of space charge, composed of mobile charge carriers, on the drift and diffusion of those carriers in an electric field. An apparent diffusion of carriers arises from the difference equations used to solve the transport problem, even though no diffusion term is included in the transport equations. This calculated diffusion is shown to be exact in the absence of space charge and in the limit of infinitely small calculation intervals. Numerical results illustrating the effect of space charge upon apparent diffusion coefficients and drift velocities are given for a fictitious gas. Calculations show good agreement with experimental data taken in two other laboratories to measure attachment coefficients in gases. Exploratory calculations have indicated the usefulness of this model for calculations in solid-state transport. (Author)

AD-429 856 Div. 25, 6
OTS price $7.60

Hughes Research Labs., Malibu, Calif.
LASER DEVICES EXPLORATORY INVESTIGATION.
Interim scientific rept. no. 3, 1 Nov 63-31 Jan 64.
31 Jan 64, 82p.
Contract AF33 657 11650
Unclassified report

Descriptors: (*Lasers, Solid state physics), Crystal growth, Interferometers, Materials, Ruby, Lanthanum compounds, Fluorides, Optical equipment, Lenses, Spinels, Spectroscopy, Rubidium compounds, Uranium, Sulfates, Impurities, Praesodymium, Fluorescence, Atomic energy levels, Raman spectroscopy, Solutions, Organic compounds, Diamonds, Calcite, Single crystals, Light transmission, Scattering, Polarization, Measurement, Chromium, Fourier analysis, Integral transforms, Photons, Line spectrum.

Pinhole mode selectors have been sucessfully analyzed by a theory which does not depend on the assumption of differences in propagation angle between different transverse modes. The frequency spacing between transverse modes was

determined to be 160 ± 40 Mc in a 1-in. ruby, agreeing with effectively-curved-reflector resonator theory. Regular spiking in a Hughes Model 200 laser appears to be correlated with simultaneous excitation of many transverse modes. Under construction are an elliptical cavity and dewar for cw laser operation which will use as coolant liquid nitrogen precooled below its boiling point. Experiments intended to decrease the emission line width of chromium in spinel by varying the host composition have not yet been successful. Future work on lanthanum trifluoride preparation will utilize HF atmospheres. The optical spectroscopy of Pr(3+) -doped LaF3 was studied; the microwave spectrum of LaF3 doped with terbium indicated the presence of Tb(4+). (Author)

AD-429 860 Div. 25
OTS price $5.60

General Applied Science Labs., Inc., Westbury, N. Y.
EFFECTS OF TRANSMITTED RADIATION PATTERNS ON THE RADAR RETURN FROM A PLASMA-CONTAINING HALT-SPACE UNDER OBLIQUE ILLUMINATION,
by Frank Lane and Sulmo Mariano. 31 Dec 63, 59p. Technical rept. no. 372
Contract NOw63 0637c
Unclassified report

Descriptors: (*Electromagnetic fields, Radar signals), (*Plasma physics, Theory), Transformations (Mathematics), Fourier analysis, Integral transforms, Polarization, Plasma sheath, Ionization, Illumination.

The effects are assessed on back scattering from a simple plasma configuration of a class of incident electromagnetic wave patterns which bears a closer resemblance to actual radar field patterns. Thus, for the first phase effort a half-space of uniform plasma (uniform electron density) is exposed to a linearly polarized incident field with a lobe pattern similar to patterns actually achieved and with a variable parameter capable of sharpening up or broadening out this pattern. The axis of the main lobe is directed obliquely with respect to the interface separating the plasma and the free-space, the angle between the normal and the main lobe axis constituting another variable parameter in the study. Finally the distance of the radar (the same radar is assumed to be transmitting and receiving the present analysis) from the vacuum-plasma interface is adjustable, and the plasma strength is also adjustable. (Author)

AD-429 866 Div. 25
OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 8. SOLID STATE.
Quarterly progress rept., 1 Oct-31 Dec 63, 15 Jan 64, 5p.
Contract AF19 628 500
ESD TDR64 15 Unclassified report

Descriptors: (*Lasers, Solid state physics), (*Materials, Spectroscopy), Research program administration, Magnetic properties, Diodes (Semiconductor), Injection, Calcium compounds, Fluorides, Impurities, Uranyl radicals, Gallium compounds, Indium, Arsenides, Neodymium, Luminescence, Emissivity, Line spectrum, Phonons, Ferrites, Spinels, Crystal structure, Magnetostriction.

AD-429 881 Div. 25
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EMPLOYMENT OF ASYMPTOTIC METHODS IN SOLVING PROBLEMS ABOUT THE MOVEMENT OF AN ASTATIC GYROSCOPE IN CARDAN SUSPENSION,
by D. M. Klimov and L. N. Slezkin. 31 Jan 64, 11p.
FTD TT63 1038 Unclassified report

Trans. from Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika: Mashinostroyeniye, no. 3, pp. 45-50, 1963.

Descriptors: (*Gyroscopes, Motion), (*Gimbals, Friction), Non-linear differential equations, Perturbation theory, Polynomials, Oscillation, Damping.

With the asymptotic method is solved a system of two nonlinear differential equations of the second order for the case, when the characteristic determinant of the imperturbed system has, in addition to roots ± iw, two zero roots with linear elementary denominators. It is assumed that the right parts of equations of perturbed system appear to be periodically functions of time. The investigation is conducted for a nonresonance case. In role of example is discussed the problem about the movement of an astatic gyroscope in Cardan suspension with a dynamically not equilibrated rotor in the presence of small moment of dry and viscous friction on the axes of the suspension. (Author)

AD-429 898 Div. 25
OTS price $5.60

California U., Los Angeles.
FOURTH SOUND IN HELIUM II,
by I. Rudnick and Kenneth A. Shapiro. Jan 64, 48p. Rept. no. TR23
Contract N6onr223 48, Proj. NR014 302
Unclassified report

Descriptors: (*Helium, Acoustic properties), Pressure, Mechanical waves, Density, Experimental data, Cryogenics, Electronic equipment, Acoustic equipment, Velocity, Scattering, Corrections, Propagation, Tables.

Fourth Sound is a pressure and density wave in Helium II, in which only the superfluid is in motion. The existence of this wave mode has been substantiated experimentally by measuring the frequency of a plane wave resonance in a closed-closed cylindrical acoustic resonator, as a function of the absolute temperature. The resonator was filled with a porous medium which allowed only superfluid motion. The velocity values, which were derived from the frequency data, agree to 1% with the temperature dependence predicted theoretically. The absolute value of the Fourth Sound velocity is affected by the coherent multiple scattering of the wave from the superleak material. An empirically determined correction predicts the effect of multiple scattering, as a function of superleak porosity, to 3%. The theoretical multiple scattering fomulae yield results which are correct in sign, but not in magnitude. (Author)

AD-429 903 Div. 25, 30, 8
OTS price $6.60

Digital Computer Lab., U. of Illinois, Urbana.
HIGH ELECTRIC FIELD EFFECTS IN P-N JUNCTIONS. FAST BREAKDOWNS,
by L. van Biljon. 20 Jan 64, 70p. Rept. no. 159
Contract Nonr1834 15
Unclassified report

Descriptors: (*Switching circuits, Design), Silicon, Cyclotron resonance phenomena, Capacitance, Electric fields, Phonons, Resistance (Electrical), Oscilloscopes,

Thermal conductivity, Crystal lattices, Scattering, Transport properties, Temperature, Photons, Emissivity.

The transit time of electrons across a p-n junction in which an electric field of 10 times v/m is present is investigated and proven to be about 1 picrosecond. It is shown that carrier distribution adds about 25 per cent to this time when a pulse is considered and that increasing the applied voltage does not necessarily decrease the transit time. The energy exchange between electric field, carriers, and lattice is investigated and a cause of random pulse formation suggested from the results. Experimental results are presented, obtained on Si junctions in which breakdowns occur. It is suggested that small breakdowns are established at speeds too fast for conventional oscilloscopes of sufficient sensitivity. It is proposed that the experimental technique of photon stimulation used here be further refined to allow the display of the true waveshape in time of microplasma breakdown. (Author)

AD-429 930 Div. 25, 9
OTS price $1.60

Cornell U., Ithaca, N. Y.
THE ULTIMATE HYDROMAGNETIC FLOW PAST AN AIRFOIL FOR AN ALIGNED MAGNETIC FIELD,
by G. S. S. Ludford and S. Leibovich. Dec 63, 20p. TR6
Contract Nonr40146, Grant G19911
Unclassified report

Descriptors: (*Magnetohydrodynamics, Fluid dynamic properties), (*Fluid dynamic properties, Magnetohydrodynamics), (*Air foils, Magnetohydrodynamics), Magnetic fields, Liquids, Velocity, Propagation, Linear systems, Perturbation theory, Equations, Fluid flow, Electric fields.

AD-429 952 Div. 25
OTS price $9.10

Boeing Scientific Research Labs., Seattle, Wash.
THE HELICAL INSTABILITY OF THE PLASMA COLUMN WITH A FINITE AMPLITUDE,
by Roy R. Johnson. June 63, 106p. Rept. no. D1 82 0256
Unclassified report

Also available from the Author.

Descriptors: (*Plasma medium, Stability), Helixes, Plasma physics, Magnetic fields, Equations, Motion, Ions, Electrons, Functions, Density, Energy, Electric fields, Hysteresis, Gases, Pressure, Paramagnetic materials.

The helical stability of the plasma column in a longitudinal magnetic field is investigated using the macroscopic equations of motion and continuity for ions and electrons. The results are combined with the energy balance equations for the positive column in order to determine the longitudinal electric field as a function of the applied magnetic field. The frequency of the helix is calculated as a function of the applied magnetic field and compared with the experimental findings. The internal magnetic field of the helix is also calculated as a function of the applied magnetic field. It is found that the positive column is paramagnetic when the neutral gas pressure exceeds a certain value and the applied magnetic field is increased. (Author)

AD-429 964 Div. 25, 22
OTS price $14.00

Notre Dame U., Ind.
PRELIMINARY DESIGN OF DYNAMIC-STATIC DIRECT SHEAR APPARATUS FOR SOILS AND ANNOTATED BIBLIOGRAPHIES OF SOIL DYNAMICS AND CRATERING,
by Richard D. Woods. 1963, 207p.
Proj. 1080, Task 108008
RTD TDR63 3050 Unclassified report

Master's thesis.

Descriptors: (*Soils, Test methods), (*Soil mechanics, Test methods), (*Bibliographies, Soil mechanics), (*Cratering, Bibliographies), Design, Dynamics, Shear stresses, Nuclear explosions, Mechanical waves, Propagation, Strain (Mechanics).

This report contains a critical review of the literature on the dynamic testing of soils. The review was conducted prior to the design of an apparatus for dynamic direct shear tests. The specifications for the apparatus generated from this review and the preliminary design of the apparatus are presented. Included are appendixes containing annotated bibliographies (421 entries) on soil dynamics, stress-wave propagation, and nuclear and high-explosive cratering. (Author)

AD-429 986 Div. 25, 8
OTS price $9.60

Texas Instruments, Inc., Dallas.
LOW WORK FUNCTION SEMICONDUCTOR COLLECTORS.
Summary rept. no. 2, 1 Nov 62-31 Oct 63,
by R. A. Chapman, H. J. Caulfield and H. W. Hemstreet, Jr. Nov 63, 114p. Rept. no. 08 63 168
Contract Nonr3705 00FBM, Proj. 099 364
Unclassified report

Report on Basic Research in Thermionics.

Descriptors: (*Semiconductors, Collecting methods), (*Work functions, Semiconductors), (*Semiconducting films, Work functions), Thermionic converters, Energy conversion, Cesium alloys, Measurement, Experimental data, Stability, Emissivity, Photoelectrons, Diodes (Semiconductors).

Cesium compound semiconductor films (Cs-Sb, Cs-Te, Cs-Bi, Cs-Ag-O, Cs-Ni-O, Cs-Sb-In, Cs-Sb-Se, Cs-Pb, Cs-Si) were investigated as collectors for thermionic energy coverters. Primary parameter of interest was the thermionic work function. For collectors in a thermionic diode with a low-pressure cesium atmosphere (10 to the minus 4 Torr), collector work functions were determined from current-voltage characteristics and known emitter work function. A device was built to compare consecutively five collectors opposite a single emitter and under identical plasma conditions. Preliminary tests demonstrate that as collectors are moved opposite the emitter, shifts in current-voltage characteristics provide accurate information on collector work functions at realistic cesium pressures. A stability test indicates that the work functior of a Cs-Sb collector at 200 C and TCs = 137 C is stable to within ±0.05 eV for at least 1900 hours. (Author)

AD-430 009 Div. 25, 15
OTS price $5.60

General Applied Science Labs., Inc., Westbury, N. Y.
BACK-SCATTERING BY A CORRUGATED PLASMA CONFIGURATION-HOMOGENEOUS PLASMA, NORMAL INCIDENCE,

LONG CORRUGATION WAVE LENGTH,
by F. Lane, S. Mariano and G. Weilerstein.
6 Jan 64, 56p. Technical rept. no. 394 .
Contract NOw63 0637c
Unclassified report

Descriptors: (*Plasma medium, Scattering), Plasma physics, Configuration, Cylindrical bodies, Electron density, Distribution, Oscillation, Gas ionization, Vector analysis, Functions, Analysis.

AD-430 016 Div. 25
OTS price $1.10

RCA Labs. Div., Radio Corp., of America, Princeton, N. J.
CAF2 LASER CRYSTAL GROWTH,
Status rept. no. 3,
by Herbert A. Weakliem. 9 Jan 64, 3p.
Contract Nonr4133 00, Proj. 3730
Unclassified report

Descriptors: (*Lasers, Crystal growth), (*Calcium compounds, Fluorides), Chromium, Impurities, Transition elements, Rare earths, Fluorescence, Absorption spectrum, Emissivity, Hyperfine structure, Dysprosium, Thulium, Holmium.

AD-430 020 Div. 25
OTS price $1.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
(No title).
Quarterly rept. no. 6, 1 Oct-1 Dec 63.
1 Dec 63, 13p.
Contract Nonr184188 Unclassified report

Descriptors: (*Dielectrics, Halides), (*Alkaline earth compounds, Dielectrics), (*Fluorides, Dielectrics), (*Lead compounds, Halides), Dielectric properties, Color centers, Impurities, Oxygen, Sulfur, Calcium compounds, Strontium compounds, Barium compounds, Purification, Zone melting, Crystal growth, Phase studies, Bromides, Chlorides, Solid solutions.

Crystals of alkaline earth fluorides grown by the Bridgman or to a lesser extent by the pulling technique are frequently colored (yellow, green, or violet). The coloration can be removed by annealing the colored crystals in a graphite crucible above 1000 C, under a neutral atmosphere such as argon. Absorption spectra of colored alkaline earth fluorides are similar to those obtained by coloration with high-energy quanta or particles. The chemical preparation and purification of lead halides has proven more complicated than expected; the impurities which cause the darkening of crystals are especially elusive. Sulfur seems to be the impurity causing darkening. Dielectric measurements of CaF2, SrF2, and BaF2, are reported. (Author)

AD-430 038 Div. 25, 6
OTS price $3.60

Syracuse U., Research Inst., N. Y.
A STUDY OF MATERIALS FOR IR DETECTORS.
Semiannual rept. no. 4,
20 Jan 64, 34p.
Contract AF33 657 7590
Unclassified report

Descriptors: (*Infrared detectors, Antimony alloys), (*Semiconductors, Impurities), (*Low temperature research, Instrumentation), Hall effect, Gallium alloys, Indium alloys, Optical instruments, Infrared radiation, X-ray diffraction analysis, Cryostats, Analysis, Alloys, Infrared optical systems.

Several possibilities have been investigated to date. The material In-Ga-Sb with various proportions of In and Ga has shown considerable promise and the progress on the work is described. (Author)

AD-430 040 Div. 25
OTS price $1.10

Harvard U., Cambridge, Mass.
HIGH PRESSURE CONTRACT, NO. NONR-1866(10).
Progress rept. no. 28,
Aug 63, 10p.
Contract Nonr186610
Unclassified report

Descriptors:
(*High-pressure research, Solid state physics), Optical properties, Electrical properties, Lead compounds, Tellurides, Single crystals, Epitaxial growth, Measurement, Tin, Intermetallic compounds, Semiconductors, Transition elements, Oxides, Spectrum analyzers, Detectors, Lasers.

AD-430 051 Div. 25, 2
OTS price $10.10

Air Force Cambridge Research Labs., Bedford, Mass.
THE WHISTLER-HYDROMAGNETIC EXTENSION OF MAGNETO-IONIC THEORY,
by Gideon Kantor. Dec 63, 118p.
Proj. 4603
AFCRL 63 929 Unclassified report

Doctoral thesis.

Descriptors: (*Whistlers, Magnetohydrodynamics), Atmospheric electricity, Mathematical analysis, Refractive index, Electron density, Electromagnetic waves.

The whistler-hydromagnetic extension of magneto-ionic theory is studied in detail, and includes derivations of exact and approximate expressions for the phase refractive index; computation of numerical values, considering protons; plots of standard curves as well as refractive index surfaces; and plots of error curves for the approximations. (Author)

AD-430 069 Div. 25
OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
ATOMISTIC EXPRESSION OF HARDNESS,
by J. N. Plendl and P. J. Gielisse. Feb 63, 28p.
Proj. 5634
AFCRL 63 26 Unclassified report

Descriptors: (*Hardness, Non-metals), Theory, Mechanical properties, Crystal lattices, Energy, Solid state physics.

Hardness of nonmetallic solids, defined as resistance against structure break-down, has been re-examined for eighty-eight solids of twenty-two different structures. The validity of the previously proposed volumetric cohesive energy, U/V, as a direct measure of hardness, has been more fully substantiated by additional data. The essential subdivision of solids into hard core and soft core could be more clearly defined. A formula is proposed which expresses hardness in terms of physical constants and measurable physical parameters only. The formula shows hardness to be directly proportional to the force constants, a structure factor and the effective valency but inversely proportional to the interatomic distance. This form-

ulation has a direct bearing on problems, such as hardness anisotropy and solid solution hardness. (Author)

AD-430 073 Div. 25
OTS price $4.60

Boeing Scientific Research Labs., Seattle, Wash.
HYSTERESIS IN STABILITY CONDITIONS OF ELECTRON-HOLE PLASMA,
by Betsy Ancker-Johnson. Dec 63, 44p. Document no. D1 82 0325
Unclassified report

Also available from the author.

Descriptors: (*Plasma medium, Electrons), Stability, Hysteresis, Plasma physics, Oscillation, Electric fields, Experimental data, Tables, Theory, Magnetic fields, Density, Perturbation theory, Magnetic pinch.

The investigation of the hysteresis occurring in the threshold conditions for the helical instability oscillations in electron-hole plasma has been extended. The hysteresis in electric field strength E can exceed 45 V/cm and 50% of the applied E at threshold. By determining the stability-instability boundary in p-InSb as a function of the parallel (or anti-parallel) electric and magnetic field strengths and also the plasma denstiy, the magnetic field induced by the formation of the helical density perturbation is deduced. Resulting displaced loop B-H curves are presented. (Author)

AD-430 074 Div. 25
OTS price $1.60

Harvard U., Div. of Engineering and Applied Physics, Cambridge, Mass.
HIGH PRESSURE.
Progress rept. no. 29.
Nov 63, 20p.
Contract Nonr1886 10
Unclassified report

Descriptors: (*Physics, Scientific research), (*Engineering, Scientific research), Lead compounds, Pressure, Optical properties, Electrical properties, Tin, Intermetallic compounds, Crystals, Spin, Resonance, Measurements, Semiconductors, Semiconducting films.

AD-430 088 Div. 25
OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
EXPERIMENTAL STUDY OF CONTACT HEAT EXCHANGE,
by Yu. P. Shlykov and E. A. Ganin, tr. by Walter Urusky. 28 Jan 64, 15p.
RSIC 128 Unclassified report

Trans. from Teploenergetika, 8:7, pp. 73-76, 1961.

Descriptors: (*Thermal conductivity, Joints), (*Heat transfer, Metal joints), Surface temperatures, Surface properties, Test equipment, Steel, Copper, Measurement, Tables, Gases.

The thermal resistance of actual contact was experimentally determined. For soft metals with a relatively high heat conductivity, the basic heat flow in the contact zone passes through the area of actual contact, while for hard metals with relatively low heat conductivity, the heat is mainly passed through gas. The change in the over-all thermal resistance dependent on the load determines the change in conductivity of the actual contact. (Author)

AD-430 105 Div. 25
OTS price $6.60

Pittsburgh U., Pa.
''MEASUREMENTS OF CHARGE TRANSFER AND IONIZATION CROSS SECTIONS'',
by James F. Nolan. Dec 63, 63p. Technical rept. no. 18
Contract Nonr624 06
Unclassified report

Report on Capture-Loss and Ionization Cross-Sections of Ions and Neutral Particles.

Descriptors: (*Ions, Measurement), (*Elementary particles, Measurement), (*Charged particles, Measurement), Atoms, Energy, Ionization, Equations, Ionization chambers, Electrodes, Solenoids, Calibration, Mass spectroscopy, Proton beams, Magnetic fields.

AD-430 129 Div. 25
OTS price $4.60

Aerospace Corp., Los Angeles, Calif.
INVESTIGATION OF GAS LASERS AND NONLINEAR OPTICAL EFFECTS.
Semiannual technical note, 1 Jan-30 June 63,
by T. S. Hartwick, E. R. Peressini, R. C. Ward and C. J. Buczek. 21 Dec 63, 45p. Rept. no. TDR169 3250 21TN2
Contract AF04 695 169
SSD TDR63 351 Unclassified report

Report on Electronics Research Program.

Descriptors: (*Lasers, Gases), (*Frequency modulation, Magnetic fields), Gas discharges, Helium, Neon, Direct current, Electrodes, Optical properties, Radar.

An analysis is given of frequency modulation of a gas laser by a time-varying axial magnetic field. Preliminary experimental results are reported. A helium-neon laser employing a dc-excited discharge between close-spaced parallel electrodes has yielded laser action at a wavelength of 1.15 microns. Analysis and experimental results show that the 'gain-switching' technique will be very useful for the repeated, reliable production of short, high-power laser pulses needed in the study of nonlinear optical effects and in optical radar. (Author)

AD-430 154 Div. 25
OTS price $5.60

South Dakota School of Mines and Technology, Rapid City.
HIGH-TEMPERATURE THERMAL CONDUCTIVITY MEASUREMENTS OF IMPURE INDIUM ANTIMONIDE,
by Orville C. Rodenberg. 1 Oct 63, 59p. Technical rept. no. 10
Contract Nonr2964 01, Proj. NR017 208
Unclassified report

Master's thesis.

Descriptors: (*Indium compounds, Antimony compounds), (*Thermal conductivity, Measurement), Magnetic fields, Resistance (Electrical), Experimental data, Heaters, Temperature, Materials, Standards, Sampling, Bismuth compounds, Tellurium compounds, Sulfur compounds.

A series comparison method was employed in measuring thermal conductivity and effects of a magnetic field on transport properties of one sample of $Bi_2Te_3S_5$ and on three heavily doped samples of p-type InSb. In each experimental run, a sample was sandwiched between two standards of Inconel 702, with low resistance thermal and electrical contacts provided by a cement

composed of sodium silicate and graphite. Thermocouples of platinum and platinum plus ten percent rhodium were employed in measuring temperatures. Measurements were carried out in a vacuum of approximately 6(10) to the -5th power Torr. For each sample of InSb, the electronic contribution was calculated and then subtracted from the total to obtain the lattice thermal conductivity; the reciprocal of this is the lattice thermal resistivity W sub g. Contributions to W sub g from phonon scattering by phonons, impurities, and holes were estimated. Measurements of the relative change of thermal conductivity, electrical resistivity, and Seebeck coefficient were performed on all samples in a magnetic field of 8300 Gauss. In addition, the relative change in electrical resistivity was determined at 296 K on Bi8Te7S5 in fields ranging from 1000 to 8300 Gauss. (Author)

AD-430 167 Div. 25, 17
OTS price $1.25

Watervliet Arsenal, N. Y.
THE STUDY OF THE STRUCTURAL AND TRANSFORMATION CHARACTERISTICS OF THE PRESSURE INDUCED POLYMORPHS IN BISMUTH,
by T. E. Davidson and A. P. Lee. Nov 63, 42p.
Proj. 1A0 13001A039
WVT RR6318 Unclassified report

Descriptors: (*Bismuth, Crystal structure), (*Crystals, Deformation), Transformations, High-pressure research, Anisotropy, Hysteresis, Grain structures (Metallurgy), Resistance (Electrical), Calibration, Hydrostatic pressure.

It is known from the early work of Bridgman that the two lowest pressure transitions (I-II and II-III) are accompanied by substantial and abrupt changes in resistivity and volume, the former being highly desirable for pressure calibration purposes. However, unlike the temperature induced allotropic transformations observed in such elements as lithium, cobalt, tin, etc., there is little actually known about many of the characteristics of the pressure induced transitions. This curren. work involves an examination of the structural and transformation characteristics of the bismuth I-II and II-III transitions under hydrostatic pressures. The relationship of initial structure to the transformation pressure, rate, resistivity change, and resultant structure is discussed. It is shown that the transition pressure and transformation rate are independent of the presence of grain boundaries and associated anisotropy induced deformation. An observed hysteresis in both the I-II and II-III transitions is shown. (Author)

AD-430 189 Div. 25
OTS price $2.60

Polymer Research Inst., U. of Mass., Amherst.
THE TRANSMISSION OF CRYSTAL AGGREGATES BETWEEN POLARIZERS,
by R. S. Stein and S. Clough. 26 Nov 63, 25p.
Rept. no. TR67
Contract Nonr335701, Proj. NR356 378
Unclassified report

Descriptors: (*Polymers, Light transmission), (*Crystals, Polarization), Anisotropy, Crystallization, Partial differential equations, Optical properties, Optical equipment.

The presence of an optically anisotropic body between crossed polarizers generally results in the transmission of light. This has been used to study the rate of crystallization of spherulitic polymers. For the method to be applicable, it is necessary that the sample be thin and be examined in sufficiently early stages of crystallization so that spherulite overlap is negligible. Also, the sample must have no macroscopic orientation. All of the transmission should be a consequence of the presence of spherically or circularly symmetrical anisotropic bodies and should not result from any overall anisotropy. Also, the existing derivations are two dimensional in nature. It was desired in this investigation to study the kinetics of crystallization in oriented polymers. Assuming analysis of the results is possible, the light transmission method is a convenient means of following such crystallization. It is the purpose of this paper to analyze the transmission of light for an oriented polymer film between polaroids with their polarization directions set at an arbitrary angle. (Author)

AD-430 195 Div. 25
OTS price $1.10

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
PROGRAM FOR ACTIVE SEGMENTATION AND REDUCTION OF PHONETIC PARAMETERS,
by Syuji Inomata. Sep 63, 6p. Rept. no. SR12
Contract AF19 604 6102, Proj. 4610, Task 461002
AFCRL 63 554 Unclassified report

Fourth International Congress on Acoustics, 21-28 Aug 62, Copenhagen.

Descriptors: (*Acoustics, Symposia), (*Speech, Data processing systems), Digital computers, Production, Test methods, Physiology, Anatomy, Sound.

AD-430 196 Div. 25
OTS price $1.10

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
ACOUSTICAL DESCRIPTION OF SYLLABIC NUCLEI: DATA DERIVED BY AUTOMATIC ANALYSIS PROCEDURES,
by A. S. House, A. P. Paul, K. N. Stevens and Jane B. Arnold. Sep 63, 6p. Rept. no. SR13
Contract AF19 604 6102, Proj. 4610, Task 461002
AFCRL 63 555 Unclassified report

Fourth International Congress on Acoustics, 21-28 Aug 62, Copenhagen.

Descriptors: (*Speech transmission, Acoustic properties,), (*Speech transmission, Computers), (*Speech, Synthesis), (*Acoustics, Symposia), Test methods, Spectrum analyzers, Production, Digital computers, Automation, Frequency.

AD-430 197 Div. 25
OTS price $1.10

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
ACOUSTICAL DESCRIPTION OF SYLLABIC NUCLEI: AN INTERPRETATION IN TERMS OF A DYNAMIC MODEL OF ARTICULATION,
by A. S. House, K. N. Stevens and A. P. Paul.
Sep 63, 6p. Rept. no. SR14
Contract AF19 604 6102, Proj. 4610, Task 461002
AFCRL 63 556 Unclassified report

Fourth International Congress on Acoustics 21-28 Aug 62, Copenhagen.

Descriptors: (*Speech transmission, Models (Simulation)), (*Acoustics, Symposia), Data, Frequency, Theory, Reduction.

AD-430 219 Div. 25
OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
ON THE SOLVABILITY OF THE BOGOLIUBOV KINETIC

THEORY FOR PLASMAS,
by R. C. Mjolsness. 30 Dec 63, 37p. Rept. no. TR1
Contract Nonr418800, Proj. NR061 147
Unclassified report

Descriptors: (*Kinetic theory, Plasma physics), (*Plasma physics, Kinetic theory), Magnetic fields, Statistical functions, Thermodynamics, Theory.

Contents: The Kinetic Equations; Solvability Conditions When No Magnetic Field Is Present; Solvability Conditions For A Plasma In An External Magnetic Field.

AD-430 336 Div. 25
OTS price $.75

Harry Diamond Labs., Washington, D. C.
CALCULATIONS OF ELECTRICAL BREAKDOWN IN GASES,
by A. L. Ward. 10 Jan 64, 29p.
Proj. 96600
HDL TR1193 Unclassified report

Descriptors: (*Electric discharges, Gases), (*Gases, Electrical discharges), Gas discharges, Electric potential, Gas ionization, Electron tubes, Molecules, Digital computers, Programming (Computers), Electric currents, Current density, Ultraviolet radiation, Space charges.

A brief review of the basic processes leading to electrical breakdown in gases is given. Formulae are derived for calculating the breakdown voltages of tubes filled with noble or molecular gases. An electronic computer program for calculating complete voltage versus current-density static characteristics is outlined. The calculated lowering of the breakdown voltage with increased ultraviolet irradiation of the cathode illustrates the utility of the time-independent computer program. The actual breakdown transition is calculated using the Townsend model, as modified by space charge, in a dynamic computer program. The agreement of the calculations with published breakdown data is excellent, even for the short breakdown times previously thought explainable only by gas photoionization streamers. (Author)

AD-430 340 Div. 25
OTS price $2.60

General Electric Co., Syracuse, N. Y.
SEMICONDUCTOR LASER AMPLIFIER TECHNIQUES (SEMLAM).
Jan 64, 26p.
Contract AF30 602 3111, Proj. 4506, Task 450602
RADC TDR63 553 Unclassified report

Descriptors: (*Lasers, Semiconductors), (*Diodes (Semiconductor), Gases), Cryogenics, Transmission lines, Pulse generators, Gallium compounds, Arsenides, Oxygen, Tungsten.

The construction of a cryogenic dewar is described, including the design of the jig to hold diodes, special pulse circuits to provide proper current pulse to the diode, the construction of an oxygen gas laser, and measurement data on tungsten package GaAs CW diodes. (Author)

AD-430 354 Div. 25, 21, 31
OTS price $2.75

Atomic Energy Commission, Div. of Research, Washington, D. C.
BASIC RESEARCH IN THERMIONIC ENERGY CONVERSION.
Annual technical summary rept. no. 3, 1 Nov 62-31 Oct 63,
by C. Warner and L. K. Hansen. 31 Oct 63, 152p.
Rept. no. AI64 20
Contract Nonr3192 00
Unclassified report

Descriptors: (*Thermionic converters, Energy), (*Nuclear power plants, Thermionic converters), Ions , Electrons, Transport properties, Statistical mechanics, Cesium, Adsorption, Experimental data, Electric currents, Diodes (Electron tubes), Relaxation time.

This report presents the results of the past year's work in a continuing program to investigate basic processes in thermionic energy conversion important to a thermionic nuclear power plant for naval applications. The previous work was reported in AI-6799, First Summary Report on Basic Research in Thermionic Conversion Processes, and AI-7979, Second Annual Technical Summary Report for Basic Research in Thermionic Energy Conversion. The subjects discussed in the present report are: Electron-Rich, Unignited Mode, Ion-Rich, Unignited Mode, Transport and Relaxation Parameters, Statistical Mechanics of Cesium Adsorption, Guard Ring Diode and Preliminary Results. (Author)

AD-430 431 Div. 25
OTS price $3.60

Polymer Research Inst., U. of Mass., Amherst.
BIREFRINGENCE CORRECTION FACTORS FOR THE SCATTERING OF LIGHT BY AN ANISOTROPIC SAMPLE,
by R. S. Stein and S. N. Stidham. 5 July 62, 36p. Technical rept. no. 47
Unclassified report

Descriptors: (*Refraction, Scattering), Optical phenomena, Anisotropy, Polarization, Light transmission, Theory.

AD-430 457 Div. 25
OTS price $2.60

Bologna U. (Italy).
SUBJECT OF THE RESEARCH: RESEARCH INTO THE CHEMICAL BEHAVIOUR OF SURFACES OF SINGLE-CRYSTALS AND BI-CRYSTALS UNDER OXIDIZING AND REDUCING CONDITIONS.
Final technical rept., 1 Nov 63-31 Jan 64,
by Paolo Spinedi. 31 Jan 64, 28p.
Contract DA91 591EUC2744
Unclassified report

Descriptors: (*Single crystals, Surfaces), (*Crystals, Surfaces), (*Surfaces, Crystals), Oxidation, Reduction (Chemistry), Tin, Zinc, Germanium, Etched crystals, Vapor plating, Surface properties, Grain structures (Metallurgy), Iron, Liquid metals, Aromatic compounds, Hydrocarbons, Laboratory equipment.

Research activities concerning chemical behaviour of single- and bi-crystals under oxidizing and reducing conditions are summarized. They are (1) behavior of Sn single- and bi-crystal surfaces under controlled oxidizing conditions; decoration of Sn single- and bi-crystal surfaces by pure Zn or Cd, from vapour phase; (3) Ge single-crystal surfaces under controlled oxidizing conditions; (4) decoration of single- and bi-crystal surfaces by organic substances; (5) controlled etching of single-crystal; (6) new devices. (7) penetration of a liquid metal or alloy along the grain boundary of a bi-crystal; and (8) review of research in the field of controlled reduction of oxide crystals. (Author)

AD-430 531 Div. 25, 20
OTS price $8.10

Republic Aviation Corp., Mineola, N. Y.
THE DESIGN OF A LABORATORY EXPERIMENT TO STUDY THE EARLY HISTORY OF A NUCLEAR EXPLOSION ABOVE THE EARTH'S ATMOSPHERE BUT WITHIN THE EARTH'S MAGNETIC FIELD. VOLUME II.
16 Dec 60, 83p.
Contract AF29 601 2325
AFSWC TR60 68, Vol. 2
Unclassified report

Descriptors: (*Plasma physics, Nuclear explosions), (*Nuclear explosions, High altitude), Terrestrial magnetism, Probes (Electromagnetic), Calibration, Liquid metals, Magnetic pinch, Design.

Contents: Thermalization of counterstreaming plasmas; Electric probe experiments; The use of magnetic probes to measure the field in a magnetic piston; Calibration of a magnetic probe; Liquid-metal instability experiments.

AD-430 548 Div. 25, 7, 9
OTS price $6.60

Martin-Marietta Corp., Baltimore, Md.
RESEARCH PROGRAM ON CLOSED-CYCLE MAGNETOPLASMADYNAMIC ELECTRICAL POWER GENERATION WITH NON-EQUILIBRIUM IONIZATION.
Semi-annual technical summary rept., 15 June-15 Dec 63,
by W. B. Bienert. Feb 64, 64p. Rept. no. MND3127
Contract Nonr3866 00
Unclassified report

Descriptors: (*Power, Generators), (*Generators, Magnetohydrodynamics), Gas ionization, Electrical conductance, Density, Temperature, Materials, Cesium, Injection, Distribution, Analysis, Design, Heaters, Magnetic fields, Electrodes.

The objective of this program is to demonstrate the feasibility of non-equilibrium ionization as a means of effectively increasing the conductivity of the working fluid in a magnetoplasmadynamic (MPD) power generator. At the present time non-equilibrium ionization is the only practical method of achieving high output power densities at gas temperatures suitable for long life operation with materials now available. In support of the experimental part of this program and to guide in the selection of experimental conditions, two programs are being carried out: one involving the process of non-equilibrium ionization, and the other involving the study and analysis of closed-cycle MPD power generation under conditions compatible with the utilization of non-equilibrium ionization in a MPD duct. (Author)

AD-430 550 Div. 25
OTS price $9.10

David Taylor Model Basin, Washington, D. C.
CABLE FUNCTION TABLES FOR SMALL CRITICAL ANGLES,
by Leonard Pode and Louis Rosenthal. Sep 55, 109P.
Proj. NS830 100
DTMB 687 Suppl. Unclassified report

Descriptors: (*Cables (Mechanical), Stresses), (*Functions, Tables), (*Tensile properties, Cables (Mechanical)), Mathematical analysis.

Supplementary tables of the cable functions used for determining the shape and tension of a flexible cable immersed in a uniform stream are presented. The tables cover the range of critical angles from 0 to 10 degrees in increments of one degree. In the neighborhood of the critical angle, values of the functions are given at intervals of 0.5 degree. (Author)

AD-430 562 Div. 25, 4
OTS price $1.10

Carnegie Inst. of Tech., Pittsburgh, Pa.
LINEAR CHAIN ANTIFERROMAGNETISM IN Mn(HCOO)2.2H2O,
by G. R. Wagner and S. A. Friedberg. 1 Jan 64, 10p. Rept. no. TR18
Contract Nonr76005, Proj. NR018 301
Unclassified report

Descriptors: (*Antiferromagnetism, Manganese compounds), Permeability (Magnetic), Measurement), Acetates, Symmetry (Crystallography), Zinc compounds, Temperature.

AD-430 574 Div. 25
OTS price $1.60

Clarendon Lab., U. of Oxford (Gt. Brit.).
MAGNETIC RELAXATION IN RARE EARTH SALTS,
by A. H. Cooke and E. J. Daintree. 20 Sep 63, 11p. Rept. no. TN3
Contract AF61 052 677
AFCRL 63 576 Unclassified report

Descriptors: (*Rare earth compounds, Magnetic properties), Spin, Helium, Temperature, Phonons, Relaxation time, Measurement, Low frequency, Theory, Magnetic fields, Crystal lattices, Energy, Ions, Electrons, Sulfates, Anisotropy.

Experiments have been made on spin-lattice relaxation in rare earth salts in the helium range of temperatures. It is found that at the lowest temperatures, at which relaxation by the 'direct' one-phonon process would be expected to predominate, the relaxation time derived from measurements by the Casimir-Du Pre low frequency method departs in several ways from the predictions of theory, and in particular increases with magnetic field. It is shown that these features can be accounted for if allowance is made for variations of the temperature of the phonons in contact with the spin system, due to a 'phonon bottleneck,' of the type postulated by Scott and Jeffries. (Author)

AD-430 580 Div. 25, 15
OTS price $2.60

Boston U., Mass.
A SPINOR FORMULATION OF ELECTROMAGNETIC THEORY IN GENERAL RELATIVITY,
by Mendel Sachs. 31 Dec 63, 22p. Scientific rept. no. 1
Contract AF19 628 2816, Proj. 5635, Task 563504
AFCRL 64 8 Unclassified report

Descriptors: (*Electromagnetism, Relativity theory), (*Relativity theory, Electromagnetism), Field theory, Partial differential equations, Integration, Theory.

The spinor formulation of the Maxwell-Lorentz theory is extended yo a generally covariant formalism. The underlying group for electrodynamics is thereby generalized from the proper inhomogeneous Lorentz group Lp to a special topological group T. It follows from the physical assumptions of this theory that the group T must be locally compact, connected, and satisfy the second axiom of countability. The invariants and conservation laws of the generalized theory are derived and a correspondence of some with those of the conventional theory is demonstrated. Remaining invariants and conservation laws have no counterpart within the usual formalism. Extra terms that appear are due to the spin-affine connection field and invariants which do not conserve reflection symmetry in space and time. Within this generalized formalism, the uniqueness of earlier derived results of a generalized Lorentz covariant theory of electromagnetism is demonstrated. The Lagrangian density for the present formulation is derived and the role played by a fundamental length, inherent in the theory, is discussed. (Author)

AD-430 606 Div. 25, 17
OTS price $8.10

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THEORETICAL HYPERVELOCITY IMPACT CALCULATIONS,
by T. D. Riney. Feb 64, 84p. Rept. no. R64SD13
Contract AF04 635 3781
Unclassified report

Descriptors: (*Hypervelocity projectiles, Impact shock), (*Impact shock, Strain (Mechanics)), Viscoelasticity, Mathematical models, Iron, Aluminum, Mechanical waves, Shock waves, High-pressure research, Cratering, Targets, Cylindrical bodies, Theory.

The principal uncertainty in the visco-plastic model of hypervelocity impact is the lack of data on strain-rate effects under the severe conditions of interest. Estimates of micron for iron and aluminum are first determined that are compatible both with observed strain-rate effects in plastic waves and the very abrupt shock profiles known to exist at pressures greater than about .2 megabar. In the second part of the report detailed calculations are presented describing the cratering process for a cylindrical projectile impacting a thick target of like metal. It is shown that momentum scaling cannot be justified; energy scaling for geometrically similar impact situations is accurately predicted upon taking into account the different rates of shock propagation during the early stages of the cratering process. (Author)

AD-430 696 Div. 25
OTS price $5.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
INJECTION LASER STUDY.
Quarterly progress rept. no. 2, 1 Sep-30 Nov 63, by G. J. Lasher, F. Stern and K. Weiser. 30 Nov 63, 58p.
Contract DA36 039AMC02349E, Proj. 3A99 21 001
Unclassified report

Descriptors: (*Lasers, Injection), Emissivity, Experimental data, Absorption spectrum, Diffusion, Manganese, Zinc, Gallium, Arsenides, Diodes (Semiconductors), Resistance (Electrical), Density, Low temperature research rare earths.

A bistable device, whose two stable states are a lasing state and a state with only spontaneous emission, both for the same current through one of two separated contracts to the p-type side of a p-n junction, was shown to be feasible. Calculations for several models of absorption and emission spectra show the device to be bistable when the area of the low-current contact is greater than the area of the high-current contact. An approximate method for determining the far-field emission pattern perpendicular to the junction plane for the lasing modes has been found. Lasing has been seen for the first time in double-diffused Mn- and Zn-doped GaAs diodes, whose negative resistance was reported previously. The threshold densities at 77 K were 5000A/cm sq and higher. (Author)

AD-430 699 Div. 25
OTS price $5.60

Kings Coll., U. of London (Gt. Brit.).
THE INVESTIGATION OF A SET OF WEAKENED FIELD EQUATIONS FOR GENERAL RELATIVITY,
by A. H. Thompson. 21 Aug 63, 56p. Rept. no. TN10
Contract AF61 052 457
ARL 63 244 Unclassified report

Descriptors: (*Relativity theory, Partial differential equations), Gravity, Vacuum, Field theory.

General relativity is considered with an alternative set of field equations. These equations are weaker than the Einstein equations in the sense that spaces which are interpreted as the gravitational field in vacuo in the orthodox theory form only a sub-set of such spaces for these field equations. The discussion is confined to the case of the gravitational field in vacuo, but in an appendix an introduction to the way in which matter is to be represented in the theory is given. Of particular interest are those spaces which are normally interpreted as giving a gravitational field in the presence of matter, but which here appear as the field in vacuo. General methods of constructing such spaces are given, and the metrics discussed on the assumption of particular symmetries. In addition, generalisations of such theorems as Birkhoff's, and that of Goldberg and Sachs are proved. (Author)

AD-430 708 Div. 25, 4
OTS price $1.60

University Coll. of Wales (Gt. Brit.).
SPECTROSCOPIC STUDIES: PART 3, ANALYSIS OF THE ACETALDEHYDE VIBRATION-ROTATION BAND NEAR 764 cm.,
by J. A. Ladd and W. J. Orville-Thomas. 30 Oct 63, 15p. TN7
Contract AF61 052 691
AFCRL 64 218 Unclassified report

Descriptors: (*Vibration, Rotation), (*Aldehydes, Analysis), Spectroscopy, Measurement, Diffraction gratings, Microwaves, Infrared phenomena, Spectrum analyzers.

The rotational structure of the 764 cm band of acetaldehyde was measured. An analysis of this band was carried out in order to correlate the observed rotational fine structure with the molecular dimensions. (Author)

AD-430 715 Div. 25, 32
OTS price $9.10

California U., Los Angeles.
ACOUSTIC PHONETICS OF KOREAN,
by Mieko S. Han. 1 Dec 63, 108p. Rept. no. TR1
Contract Nonr23380, Proj. NR049 183
Unclassified report

Descriptors: (*Language, Analysis), (*Speech, Sounds), (*Acoustics, Analysis), (*Speech recognition, Theory), Tables, Measurement, Recording systems, Speech transmission, Ear, Acuity, Audiometry.

The aim of the present research is to gather a large amount of language data in standard Korean, and to analyse this data with the aid of the spectrograph in order to ascertain all the significant speech signals which are used in the language. The spectrographic study of sound transitions and suprasegmental features, such as juncture and intonation, are planned for the immediate future. The primary objective of the present study is to utilize the spectrographic data and subsequent analysis in a better description of the phonology of Korean. Although the scope of the present investigation is limited to the domain of linguistics, the resulting data will most certainly be useful for other research. Studies on speech synthesis and automatic speech recognition require accurate knowledge of the phonology of the language as a theoretical basis. The present study aims to develop a phonology which will provide such a basis for the advanced studies. (Author)

AD-430 722 Div. 25, 30, 8
OTS price $2.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
A COMPUTER PROGRAM FOR A KRAMERS-KRONIG TRANSFORMATION OF THE OPTICAL REFLECTIVITY,
by R. J. Esposito, F. Rothwarf, R. M. Robbins, J. N. Brown and E. R. Thilo. Dec 63, 22p.
Proj. 599 01 004
PDIR M64 14 1 Unclassified report

Descriptors: (*Solids, Optical properties), (*Programming (Computers), Optical properties), Physical properties, Solid state physics, Integrals, Integral transforms, Transformations (Mathematics), Semiconductors, Programming languages, Reflection, Intensity, Copper.

Relations involving the frequency-dependent optical constants give information on the electronic properties of solids. Power reflectivity measurements at normal incidence over a wide frequency region can be utilized in obtaining the optical constants by means of a general integral transformation known as the Kramers-Kronig transformation. A computer program based on this integral transformation has been constructed in Fortran II, version 9000, language for a Remington Rand Solid State 90 computer. The program converts experimental reflectivity measurements into parameters containing the optical constants. A brief presentation of the electronic quasiparticle and collective excitation modes is given in terms of the optical constants. A discussion of the approximations made in putting the integrals on the computer is also given. Two tests were made to check the accuracy of the program. First, a test reflectivity function, for which the Kramers-Kronig integrals could be directly evaluated, was programmed. Then published reflectivity measurements on copper were analyzed. The optical constants determined by the computer program were in good agreement with both the test optical constants and the previously calculated constants of copper. (Author)

AD-430 749 Div. 25
OTS price $1.60

Centre National de la Recherche Scientifique (France).
FAR INFRARED SPECTRA OF CRYSTALS AND SOLIDS IN A LARGE RANGE OF TEMPERATURES.
Annual summary rept., 5 Jan 61-30 Apr 63, by J. Lecomte and A. Hadni. 31 May 63, 15p.
Contract AF61 052 518
AFCRL 64 22 Unclassified report

Descriptors: (*Crystals, Infrared spectroscopy), (*Solids, Infrared spectroscopy), Temperature, Liquefied gases, Helium, Instrumentation, Absorption spectrum, Theory, Cryostats, Polarizing filters, Polyethylene plastics, Crystal lattices.

AD-430 758 Div. 25, 4
OTS price $1.10

Texaco Experiment Inc., Richmond, Va.
INVESTIGATION OF THE DISSOCIATION CHEMISTRY OF -NF2 COMPOUNDS.
Quarterly summary rept. Nov 63-Jan 64, by U. V. Henderson, P. L. Goodfriend and H. P. Woods. 3 Feb 64, 8p. Rept. no. TM91496; EXP223
Contract NOnr188300
Unclassified report

Descriptors: (*Dissociation, Fluorine compounds), (*Nitrogen compounds, Fluorine compounds), (*Fluorine compounds, Dissociation), Emissivity, Fluoroamines, Photochemistry, Spectra (Visible and ultraviolet), Vacuum apparatus, Ultraviolet spectroscopy, Mass spectroscopy, Free radicals, Gases.

The work of the past quarter consisted primarily of attempts to modify the flash photolysis apparatus for use in the vacuum UV. The primary difficulty was in obtaining an intense enough source flash for this region of the spectra. Some preliminary investigations of the emission spectra produced by an electrical discharge through flowing NF3 and N2F4 were made in a search for the emission spectrum of NF. The spectra produced in both cases were identical and consisted primarily of NO, N, and F bands. No features attributable to NF were observed. The emissions produced are characteristic of the final decomposition products rather than intermediate fragments. Preparations are being made to search for emission of short-lived intermediate fragments in the electrically dissociated gases by exciting them with a capacitor discharge through the sample cell. Equipment is being developed for flash photolysis of N2F4 and NF3 in the fast-reaction cell of the time-of-flight mass spectrometer. (Author)

AD-430 766 Div. 25
OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
INFRARED ABSORPTION OF Mg2 Sn SINGLE CRYSTALS,
by Herbert G. Lipson. Nov 63, 36p.
Proj. 5621
AFCRL 63 534 Unclassified report

Descriptors: (*Semiconductors, Absorption), Spectra (Infrared), Magnesium compounds, Tin alloys, Single crystals, Impurities, Infrared phenomena, Infrared radiation, Optical properties.

Infrared transmission and reflection measurements of n- and p-type semiconducting Mg2 Sn single crystals of different impurity concentrations were made between 2 and 30 microns at temperatures ranging from 18 to 296 K. At energies of 0.22 ev and above, the rapid increase in absorption is attributed to the intrinsic edge. From the energy dependence of absorption in the edge region, the mechanism of indirect transitions between the valence and conduction bands can be established. The energy axis intercepts of the straight lines representing phonon emission decrease with temperature, indicating a negative temperature variation of the absorption edge. A band in the 0.10 to 0.22 ev energy range present at all temperatures in n-type and above 196 K in p-type samples suggests transitions between two conduction minima separated by 0.162 ev at 18 K. The presence of a fundamental lattice vibration band has been indicated from transmission and reflection measurements at longer wavelengths. The absorption spectrum of Mg2 Sn is similar in character to those reported for other semiconducting intermettalic compounds of the II-IV series. (Author)

AD-430 767 Div. 25, 15
OTS price $7.60

Mathematics Research Center, U. of Wisconsin, Madison.
THE USE OF SINGULAR INTEGRALS IN WAVE DIFFRACTION PROBLEMS WITH THE SOLUTION OF THE PROBLEM OF SCATTERING BY A DIELECTRIC WEDGE,
by Michael Papadopoulos. Nov 63, 73p. TSR 440
Contract DA11 022 ORD2059
Unclassified report

Descriptors: (*Diffraction, Integrals), (*Electromagnetic waves, Diffraction), (*Diffraction analysis, Wedges), (*Dielectrics, Wedges), Integral equations, Prismatic bodies, Complex variables, Prisms, Refraction, Functions, Reflection, Acoustics, Partial differential equations, Boundary value problems, Scattering.

The problem of diffraction by an infinite (lossless) dielectric wedge is solved, no matter what the angle of the wedge may be. The incident field is homogeneous and of degree -1, the equations governing the propagation of disturbances both inside the prism and in its surroundings, and the conditions to be enforced at the surface are all homogeneous. The diffracted field is then homogeneous and of degree -1 and represented as part

of certain integrals of Cauchy type. The calculation of these functions involves applications of the theory of complex variables. A prism with two infinite refracting surfaces has a plane of symmetry. By considering separately the symmetric and the antisymmetric parts of the total field about this plane, the problem is reduced to one involving only one refracting surface. The situation examined is the more general involving two infinite wedges with one surface and the vertex in common and with the second surface of each wedge supporting definite homogeneous boundary conditions (involving first derivatives). The solution involves satisfying conditions at the interface, at the vertex and at the diffracted wave fronts, leaving boundary conditions at the second wall of each wedge to be satisfied simultaneously by a pair of non-singular Fredholm equations. The plane wave result is used as the base of further solutions. (Author)

AD-430 796 Div. 25
OTS price $3.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
RESEARCH ON NEW CONCEPTS IN ENERGY CONVERSION.
Quarterly technical progress rept. no. 1, 1 Sep-30 Nov 63,
by W. D. Jackson, G. A. Brown, J. L. Kerrebrock and E. N. Carabateas. 30 Nov 63, 35p.
Contract AF33 616 1083
Unclassified report

Descriptors: (*Energy conversion, Scientific research), Magnetohydrodynamics, Power, Generators, Alkali metals, Thermionic converters, Ions, Liquid metals, Electrical conductance, Vapors, Cesium, Surface properties, Measurements.

AD-430 797 Div. 25
OTS price $7.60

Columbia Radiation Lab., New York.
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Quarterly progress rept. no. 4, 16 Sep-15 Dec 63,
by R. Novick. 15 Dec 63, 77p. Rept. no. CU12 63
Contract DA36 039sc90789, DA Proj. 3A99 20 001 09; NR372 101
Unclassified report

Descriptors: (*Electromagnetic waves, Scientific research), (*Microwaves, Scientific research), Helium, Ions, Radioactivity, Atoms, Molecules, Solid state physics, Masers, Microwave equipment, Lasers, Radio astronomy, Cryogenics, Superconductivity.

Direct evidence was obtained for the two-photon decay of the metastable state of the helium ion. Coincident counts were obtained between vacuum ultraviolet photon detectors which are exposed to a beam of metastable helium ions. Double-resonance and level-crossing studies of the excited states of the chromium atom are continuing. Precise values of the gJfactors and hyperfine splittings were obtained and are being interpreted on the basis of core polarization and configuration mixing effects. It was shown that the metastable autoionizing lithium atom may be partially quenched with a magentic field of several thousand gauss. Partial success was achieved in the fabrication of optical double-resonance cells for chemically reactive elements such as calcium. Theoretical studies are continuing on laser quenching of metastable atoms. Further results were obtained on the motional broadening of Rayleigh scattered light. An oscillation parameter of greater than unity was obtained with a pulsed optically pumped rubidium hyperfine maser. Studies of the microwave properties of model planetary atmospheres are continuing and a model of the Venusian atmosphere was constructed which is consistent with all available data. (Author)

AD-430 815 Div. 25
OTS price $1.60

University Coll. of Wales (Gt. Brit.).
ABSOLUTE INTENSITIES AND MEAN REFRACTIVE INDICES FROM INFRA-RED DISPERSION DATA,
by W. H. Prichard and W. J. Orville-Thomas.
30 Oct 63, 12p. Rept. no. TN6
Contract AF61 052 691
AFCRL 64 217 Unclassified report

Descriptors: (*Refractive index, Intensity), (*Infrared phenomena, Refractive index), Bromine compounds, Chlorine compounds, Iodine compounds, Halogenated hydrocarbons.

Two general relations connecting the refractive index and absolute intensities are tested. Mean refractive indices are obtained for dichloro-, dibromo- and diiodomethane. (Author)

AD-430 816 Div. 25
OTS price $10.10

Queen's U., Belfast (Gt. Brit.).
THE PROPERTIES OF HELIUM AND THE TWO-ELECTRON SYSTEMS,
by A. L. Stewart. 1964, 122p.
AFCRL 64 224 Unclassified report

Descriptors: (*Helium, Molecular properties), (*Electrons), Atoms, Ions, Theory, Analysis, Energy, Spectroscopy, Measurement, Errors, Lithium, Nuclei, Polarization, Quantum mechanics, Relativity theory.

AD-430 828 Div. 25, 2
OTS price $5.60

RAND Corp., Santa Monica, Calif.
RADIATIVE TRANSFER IN FINITE HOMOGENEOUS ATMOSPHERES WITH ANISOTROPIC SCATTERING II. THE UNIQUENESS PROBLEM FOR CHANDRASEKHAR'S PSI AND PHI EQUATIONS,
by T. W. Mullikin. Feb 64, 49p. Rept. no. RM3909PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Transport properties, Partial differential equations), Heat transfer, Anisotropy, Scattering, Phase studies, Thermodynamics.

A study is made of the existence and uniqueness problems for Chandrasekhar's psi and phi equations for radiative transfer in homogeneous atmospheres with anisotropic scattering. It is shown that for many phase functions these nonlinear equations have one-parameter families of solutions. It is shown also that the unique solution which corresponds to the solution of the radiative-transfer problem must satisfy certain linear constraints in addition to Chandrasekhar's nonlinear equations. (Author)

AD-430 836 Div. 25
OTS price $2.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
RESONANCES IN THE SMITH-PURCELL EFFECT,
by A. Hessel. 2 Dec 63, 28p. Research rept. no. PIBMRI 1198 63
Contract AF19 604 7499, Proj. 4600, Task 460004
AFCRL 63 580 Unclassified report

Descriptors: (*Optical properties, Resonance), Millimeter waves, Diffraction gratings, Optical phenomena, Radiofrequency spectroscopy, Electric currents, Partial differential equations, Electromagnetic waves, Scattering.

A rigorous solution is derived for the problem of radiation of the Smith-Purcell type extracted from a radio frequency bunched electric current sheath, above a plane exhibiting a periodically varying surface reactance. The plane is regarded as a model of an optical reflection grating. The solution indicates that the presence of the grating will give rise to electromagnetic resonance effects which are closely related to the so-called Wood Anomalies, encountered in optical grating spectroscopy. Utilization of these resonances may be advantageous in generation of millimeter waves.

AD-430 845 Div. 25
OTS price $1.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
PARALLEL PLATE SIMULATOR FOR A PLASMA SLAB,
by John D. Schlafer. 6 May 63, 16p. Research Rept. no. PIBMRI 1162 63, Scientific rept. no. 3
Contracts AF19 604 7216, AF33 657 10820, Proj. 4619, Task 46191
AFCRL 63 593 Unclassified report

Descriptors: (*Plasma sheath, Models (Simulation)), Plasma physics, Magnetohydrodynamics, Transmission lines, Attenuation, Simulation.

Contents: The plasma slab; The parallel plate structure; The modal nature of the fields, The transverse network formalism; Determination of the resonant wave numbers; Complex roots of the resonance equation; Leaky wave phase and attenuation.

AD-430 855 Div. 25
OTS price $1.60

General Electric Co., Schenectady, N. Y.
PYROMETER CORRECTION DUE TO DIMER ABSORPTION IN Cs VAPOR,
by J. M. Houston and P. K. Dederick. Feb 64, 13p. Scientific rept. no. 5
Contract AF19 604 8424, Proj. 8659, Task 865902
AFCRL 64 208 Unclassified report

Descriptors: (*Pyrometers, Optical instruments), (*Optical instruments, Pyrometers), (*Molecular properties, Absorption), (*Cesium, Vapors), Corrections, Alkali metals, Diatomic molecules, Thermionic converters, Temperature, Brightness.

Lapp and Harris have recently shown that optical pyrometer readings made through an alkali-vapor atmosphere can be significantly affected by the light absorption of diatomic molecules. This report gives their result in a form more suitable for quick reference in Cs thermionic converter work, i.e., the pyrometer correction is plotted as a function of Cs reservoir and optical-path temperature, rather than dimer partial pressure. (Author)

AD-430 889 Div. 25, 9
OTS price $8.10

Stanford Research Inst., Menlo Park, Calif.
FLUID FRICTION AND BOILING HEAT TRANSFER WITH WATER IN VORTEX FLOW IN TUBES CONTAINING AN INTERNAL TWISTED TAPE.
Final rept.,
by Lester Feinstein and R. E. Lundberg. June 63, 84p.
Contract AF30 602 2760
RADC TDR63 451 Unclassified report

Descriptors: (*Heat transfer, Fluid flow), (*Fluid flow, Friction), (*Vortices, Heat Transfer), Heat transfer, Cooling, Temperature, Liquids, Vapors, Hydraulic systems, Test equipment, Pressure, Pumps, Failure (Mechanics), Water, Nucleate Boiling, Surface Temperatures, Programming (Computers), Turbulence, Pipes, Tapes.

The problems of fluid friction and boiling heat transfer from a tube to water in vortex flow are considered. The vortex is promoted and maintained by an internal twisted ribbon. Twist ratios, y, of 2, 4, and 6 are utilized. Friction factors are measured for straight flow and vortex flow for Reynolds numbers from 60,000 to 400,000. Burnout heat is measured, as a function of flow velocity and for two different values of fluid subcooling, both in straight flow and in vortex flow. The maximum heat flux attained was 28 x 10 to the 6th power Btu/hr-sq. ft. The burnout flux measured for vortex flow is substantially lower than previously reported values. This difference is rationalized and an approximate theory developed to quantify the experimental values. The theory suggests that the values previously reported may still be conservative. The theory further indicates that, if an internal tape is used, vortex flow may be of greatest utility for cooling materials of high thermal conductivity. A comparison between maximum operating heat fluxes obtainable in straight flow and vortex flow is made on the basis of pumping power. Under certain conditions vortex flow can exhibit a two-to-one advantage over straight flow. (Author)

AD-430 891 Div. 25, 4
OTS price $3.60

Naval Radiological Defense Lab., San Francisco, Calif.
THE INFRARED SPECTRA OF RUBIDIUM BORATES OF VARYING COMPOSITION,
by J. T. Quan and C. E. Adams. 9 Dec 63, 33p.
NRDL TR705 Unclassified report

Descriptors: (*Spectra (Infrared), Borates), (*Rubidium compounds, Borates), (*Borates, Spectra (Infrared)), Oxides, Glass, Crystal structure, Hydrates, Molecular structure, Boron compounds.

The infrared transmission spectra of a series of rubidium borates consisting of varying proportions of rubidium oxide and boron oxide have been studied in the 2.5 to 15.5-micron range. The rubidium oxide concentration varied from 4.2 to 50 mole percent. Frequency assignments were made for molecular groups in these rubidium borates. The results can be interpreted to indicate that an increasing proportion of trigonally coordinated boron atoms in the borate glass network structure became tetrahedrally coordinated as the Rb20 content was increased up to 33 mole percent. This was accompanied by a simultaneous increase in the concentration of terminal B-O groups. Glasses containing Rb20 in excess of 33 mole percent tended to devitrify as boron reverted to trigonal coordination. At 50 mole percent, the rubidium metaborate structure resembled that of sodium metaborate. Selected metal oxides, introduced into glasses of high Rb20 content, entered into complex formation with B-O groups to reconstitute the network structure of the glass. (Author)

AD-430 893 Div. 25
OTS price $9.10

Theoretical Chemistry Lab., U. of Indiana, Bloomington.
A CONFIGURATION INTERACTION STUDY OF THE GROUND

STATE OF THE H3(+) MOLECULE,
by Ralph Earl Christoffersen. 1 Dec 63, 107p.
Grant AF AFOSR62 183
AFOSR 641 0001 Unclassified report

Descriptors: (*Quantum mechanics, Hydrogen), (*Atomic orbitals, Hydrogen), (*Hydrogen, Nuclear properties), Functions, Operators (Mathematics), Integrals, Energy, Mathematical models, Theory, Atomic energy levels, Integral equations, Electrons, Excitation, Configuration, Mathematical analysis.

A configuration interaction calculation on the ground state of H3(+) was done using Slater-type orbitals of the form 1s, 2s, 2px, 2py, 2pz to form the basis set. The calculation was effected by approximating the exact wave function for the system by a linear combination of configurations, each of which is a properly antisymmetrized function constructed from the basis orbitals, and by applying the variation theorem to the approximate wave function. The most stable nuclear geometry for H3(+) is an equilateral triangle, since a plot of total energy versus central bond angle shows a deep minimum at a bond angle of 60 degrees. The best energy that was obtained for the equilateral triangle was -1.33264 Hartrees at R = 1.6575 Bohrs, using 12 basis orbitals and 12 symmetry adapted configurations. The experimental energy for H3(+) is not known, but is estimated to be -1.34 Hartrees from these calculations. The first excited singlet state was examined at many values of R for an equilateral triangle with three basis orbitals, and was found to give a typical repulsive energy curve. (Author)

AD-430 915 Div. 25
OTS price $13.50

Naval Ordnance Lab., White Oak, Md.
MATHEMATICAL RELATIONS AND NUMERICAL TABLES FOR THE GEOMETRICAL ASPECTS OF DIFFUSION PROPAGATION IN ENCLOSED CHAMBERS,
by H. Gerber. 18 Dec 63, 197p.
NOL TR63 139 Unclassified report

Descriptors: (*Heat transfer, Equations), Diffusion, Propagation, Tables, Time, Temperature, Gases, Frequency, Volume, Pressure, Spheres, Cylindrical bodies, Reflections, Mechanical waves, Attenuation.

This report presents relations for determining the time-varying, average temperature which results from the diffusion of heat to the walls of a gas-filled enclosure. At infrasonic frequencies, the average temperature is the basic quantity that determines the relationship between dynamic volume and pressure changes. Sinusoidal and step changes are emphasized, and extensive, five-figure, tabulated data are given for the sphere, the infinite narrow box, and a wide range of finite cylinders. (Author)

AD-430 971 Div. 25, 20
OTS price $3.60

California U., Berkeley.
SOME NEW ASPECTS OF CYCLOTRON RESONANCE IN COPPER,
by J. F. Koch, R. A. Stradling and A. F. Kip.
12 June 63, 40p.
Grant AF AFOSR62 127
Unclassified report

Descriptors: (*Cyclotron resonance phenomena, Copper), Particle trajectories, Magnetic fields, Single crystals, Doppler effect, Absorption.

The development of improved techniques has made possible a new series of cyclotron resonance experiments on Cu which gives more accurate and extended information on electron cyclotron masses. New orbits which have been observed and measured include a limiting point orbit, orbits extending through three and four Brillouin zones, orbits whose centers are neither at the center nor edge of the zone, and orbits observed with the magnetic field tipped at large angles (up to 80 degrees) with respect to the crystal surface. The neck orbit has been observed and measured with the field along the 111 direction. The cyclotron mass ratio for this orbit is 0.46. Certain discrepancies and puzzling aspects of earlier data have been clarified and the present data are in excellent accord with de Haas- van Alphen and magnetoacoustic data on the geometry of the Fermi surface. (Author)

AD-430 972 Div. 25, 15
OTS price $1.10

Pennsylvania U., Philadelphia.
REMARKS ON THE OGUCHI TRANSFORMATION,
by Raza A. Tahir-Kheli and Herbert B. Callen.
May 63, 8p. Rept. no. TR11
Contract Nonr551 36
Unclassified report

Descriptors: (*Transformations (Mathematics), Numerical analysis), (*Ferromagnetism, Theory), Quantum statistics, Scattering, Green's function, Low temperature research, Bosons, Temperature.

It is shown that the Oguchi transformation in the theory of ferromagnetism is a low temperature spin wave approximation, the validity of which depends on the implicit assumption that the kinematical interaction can be ignored. This limitation has the consequence that the theory of Oguchi and Honma, if accepted at higher temperatures, predicts an infinite Curie temperature. (Author)

AD-430 985 Div. 25, 15
OTS price $3.60

Parke Mathematical Labs., Inc., Carlisle, Mass.
THEORETICAL CORRECTIONS FOR DETERMINING RESISTIVITY CHANGE OF METALS CAUSED BY ELECTRON BOMBARDMENT,
by Charles H. Sherman. Dec 63, 37p. Rept. no. SR2
Contract AF19 628 2419, Proj. 5620, Task 562002
AFCRL 64 2 Unclassified report

Descriptors: (*Metals, Electron bombardment), (*Electron bombardment, Metals), (*Resistance (Electrical), Electron bombardment), Radiation damage, Measurement, Scattering, Surfaces, Corrections, Mathematical analysis, Nomographs.

An observed change in the resistivity of a metal caused by electron bombardment can only be interpreted quantitiatively after certain corrections have been applied to account for unavoidable experimental complications. Three of the major corrections which must be applied in such experiments are discussed, methods are developed for calculating their values, and graphs of numerical values are presented. The three corrections considered are: (1) the energy correction to account for the energy distribution of the bombarding electrons, (2) the scattering correction to account for the zig-zag path of the electrons through the sample, and (3) the surface correction to account for the influence of the sample surfaces on the measured resistivity. (Author)

AD-430 988 Div. 25
OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
INJECTED ELECTRON-HOLE PLASMA PROPAGATION VELOCITY AND LIFETIME MEASUREMENTS IN P-TYPE INDIUM

ANTIMONIDE,
by Michael F. Berg. Dec 63, 14p. Rept. no. D1 82 0323
Unclassified report

Also available from the author.

Descriptors: (*Plasma medium, Propagation), (*Electrons, Injection), (*Velocity, Measurement), Probes (Electromagnetic), Indium alloys, Phosphorus alloys, Electric fields, Semiconductors, Oscilloscopes.

A finite time is required to complete the injection of electron-hole plasma throughout the length of a sample of InSb. Upon application of and electric field cross the sample ends, a cloud of electron-hole plasma forms at the negative contact and progresses down the sample length past two pairs of biased double probes which are spaced a known distance apart. As the front passes a probe pair it produces a decrease in resistance between the pair. This passage is observed as a pulse on a high speed oscilloscope. The velocity diminishes exponentially with decreasing electric field asymptotically to the field strength at which injection begins. (Author)

AD-431 012 Div. 25
OTS price $1.75

Goettingen U. (Germany).
RESEARCH ON SOUND PROPAGATION IN SOUND-ABSORBENT DUCTS WITH SUPERIMPOSED AIR STREAMS. VOLUME IV,
by F. Mechel, P. Mertens and W. Schilz. Dec 63, 62p.
Contract AF61 052 112, Proj. 7231, Task 723104
AMRL TDR62 140, Vol. 4 Unclassified report

Report on Biomechanics of Aerospace Operations.

Descriptors: (*Ducts, Sound transmission), Theory, Acoustics, Absorption, Acoustic properties, Measurement, Gas flow.

This report, Volume IV, presents the results (1961-1962) of several studies of the interaction between air flow and airborne sound in a duct. Three projects are discussed: (1) Part A: The effects of various sound fields on the excitation of the boundary layer of a flat plate are discussed relative to the stagnation point and the boundary layer itself. Boundary layer distortions are shown to be a function of the sound signal and flow velocity. (2) Part B: The change in the cross-sectional distribution of the sound pressure in an absorbent duct with air flow is examined with respect to the shape of the velocity profile of the flow. Even for wavelengths greater than the boundary layer thickness the sound pressure increased at the absorbing walls. (3) Part C: The dependence of the acoustic radiation impedance of a tube orifice during flow conditions is investigated as a function of the flow velocity and turbulence level. Results show that as the flow increases the radiation impedance decreases. (Author)

AD-431 025 Div. 25
OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
ON THE SOLVABILITY OF THE BOGOLIUBOV KINETIC THEORY FOR PLASMAS,
by R. C. Mjolsness. 30 Dec 63, 37p. TR1
Contract Nonr418800, Proj. NR061 147
Unclassified report

Descriptors: (*Plasma physics, Kinetic theory), (*Kinetic theory, Plasma physics), Magnetic fields, Mathematical analysis, Statistical functions, Plasma oscillations.

Contents: The kinetic equations; Solvability conditions when no magnetic field is present; and Solvability conditions for a plasma in an external magnetic field.

AD-431 030 Div. 25
OTS price $1.60

New York U., N. Y.
MOLECULAR FREQUENCY STANDARD PROJECT.
Final rept.,
by Leon Esterowitz. 24 Sep 63, 11p.
Contract Nonr285 35, Proj. NR372 142
Unclassified report

Descriptors: (*Molecular spectroscopy, Resonance), (*Frequency, Standards), Waveguides, Hyperfine structure, S band, X band, Masers, Nitrogen compounds, Dioxides.

Work is reported on:(1) molecular frequency standards, (2) microwave spectrometers, (3) hyperfine structure of the rotational spectrum of HDO, (4) rotational spectrum of formaldahyde, (5) S-band spectrum of nitrogen dioxide, and (6) the dipole moment N1502. (Author)

AD-431 031 Div. 25
OTS price $9.60

Johns Hopkins U., Baltimore, Md.
CLUSTER-EXPANSION CORRECTIONS TO THE DEBYE-HUCKEL PAIR-CORRELATION FUNCTION FOR IONIZED GASES,
by Charles F. Hooper, Jr. Jun 63, 114p. TR1
Contract Nonr248 57, Proj. NR012 304 8 13 62
Unclassified report

Descriptors: (*Plasma physics, Electric field), Gas ionization, Ions, Line spectrum, Statistical functions, Integral transforms.

The Kolb-Griem theory of spectral line broadening occurring in plasmas is discussed; emphasis is placed on the importance of the electric microfield distribution. The Mozer-Baranger calculation of the electric microfield distribution in a plasma is outlined; its dependence upon the nature of the component particle correlations is shown. The electrons and ions must be treated separately because of their inherent differences; the electrons interact through a Coulomb field; whereas the ions interact with shielded fileds. The Salpeter cluster-expansion technique is considered in detail. It is applied to the determination of pair correlation functions and the corresponding potentials of mean force for both Coulomb and shielded fields. The calculations are made up to second order in complexity. Corrected expressions for the potentials of mean force are compared with the corresponding Debye-Huckel results. Significant differences are found; this is particularly true for the shielded-field cases. (Author)

AD-431 112 Div. 25
OTS price $2.60

Microwave Lab., Stanford U., Calif.
THE THEORY OF DIRECT TRANSITIONS IN SEMICONDUCTORS,
by R. H. Pantell, M. Didomenico, Jr. and O. Svelto. Jan 64, 19p. Rept. no. 1131
Contract Nonr 22548, Proj. NR373 361
Unclassified report

Descriptors: (*Electron transitions, Semiconductors), (*Electromagnetic fields, Theory), Crystals, Nonlinear differential equations, Simultaneous equations, Photoconductivity, Numerical analysis, Crystal lattices, Motion.

The problem of direct interband transitions in semiconducting crystals is considered in detail. The solution of the problem is shown to lead to a system of simultaneous coupled nonlinear differential equations. These equations do not distinquish between static and dynamic fields, and are obtained without recourse to any approximation procedures. They therefore apply for electromagnetic fields of arbitary amplitude. It is shown, finally, that the linearization of these equations correctly predicts the fundamental optical edge and the photoconductive rate equations which result in photomixing phenomena. (Author)

AD-431 154 Div. 25
OTS price $2.60

David Taylor Model Basin, Washington, D. C.
GRAPHICAL METHOD FOR DETERMINING MAXIMUM STRESSES IN RING-STIFFENED CYLINDERS UNDER EXTERNAL HYDROSTATIC PRESSURE,
by Martin A. Krenzke and Robert D. Short.
Oct 59, 21p.
Proj. NS731 038
DTMB 1348 Unclassified report

Descriptors: (*Cylindrical bodies, Stresses), (*Hydrostatic pressure, Cylindrical bodies), Rings, Elasticity, Measurement.

Calculation of the maximum stresses in a ring-stiffened cylinder subjected to external hydrostatic pressure as obtained from the analysis of Salerno and Pulos is facilitated by curves presented in this report. Stresses obtained by means of these curves do not deviate from those obtained by a precise calculation by more than 0.2 percent. (Author)

AD-431 182 Div. 25
OTS price $4.60

Stanford Research Inst., Menlo Park, Calif.
SOLUBILITY OF METAL OXIDES IN SUPERCRITICAL AQUEOUS SOLUTIONS.
Final rept., 1 June 62-31 Oct 63,
by W. J. Silva and R. C. Smith, Jr. 31 Oct 63, 47p.
Contract AF19 628 392, SRI Proj. PAU4117; Proj. 4608, Task 460805
AFCRL 64 38 Unclassified report

Descriptors: (*Crystal growth, Titanium compounds), (*Solubility, Crystal growth), (*Titanium compounds, Crystal growth), Single crystals, Water, High-temperature research, High-pressure research, Solutions, Oxides, Manganese compounds, Magnesium compounds, Iron compounds, Gadolinium compounds, Thermodynamics, Laboratory equipment.

An effort was made to elucidate some of the basic processes underlying the growth of single crystals from hydrothermal solutions. To grow crystals by this means it is necessary to find a region where (1) the crystal is stable, (2) the solubility of the compound is sufficient, and (3) supersaturation is neither too low nor too high for growth at a reasonable rate. The study chiefly concerns measurements of the solubility of rutile in supercritical water and basic media in the temperature range 375 to 525 C under solution pressures of 5000 to 33,000 psi. The laboratory equipment and a method for measuring the equilibrium densities of the solutions are discussed. A fundamental equation is derived which, with the use of the Van't Hoff equation, permits calculation, from only a few measurements, of the solubility of metal oxides in basic hydrothermal solutions. (Author)

AD-431 187* Div. 25
OTS price $1.60

Nobel Inst. for Physics (Sweden).
RESEARCH IN THE VACUUM ULTRAVIOLET,
by Manne Siegbahn. Dec 63, 17p.
Proj. 7073, Task 7073 01
Unclassified report

Descriptors: (*Ultraviolet radiation, Vacuum apparatus), Spectrum analyzers, Diffraction gratings, Tests, Mirrors, Design, Light transmission, Spectrographic cameras.

Experience gained in the design, construction and fabrication of two experimental vacuum ultraviolet spectrographs is reported. A spark source used in the testing of the instruments is also described. (Author)

AD-431 188 Div. 25, 14
OTS price $.75

Clemson Agricultural Coll., South Carolina.
A STUDY OF THE CRYSTALLINE TRANSFORMATION IN $LiAlSiO_4$.
Rept. for May 62-Sep 63,
by H. H. Wilson. Jan 64, 21p.
Contract AF33 616 6870, Proj. 7350, Task 735001
RTD TDR63 4151 Unclassified report

Descriptors: (*Crystal structure, Ceramic materials), (*Ceramic materials, Crystal structure), Aluminum compounds, Lithium compounds, Oxides, X-ray diffraction analysis, Transition temperature, Phase studies, Transformations, Crystal lattice defects, Laboratory furnaces, Thermal expansion, Resistance (Electrical), Heat of activation, Solid solutions, Spinels, Carbonates.

A study was made of the high-temperature phase change that occurs in $LiAlSiO_4$. The reaction has been reported to be either an order-disorder transformation or a reconstructive polymorphic inversion. Kinetics of the phase change with respect to compositional, temperature, and time variables were studied. The spinel structure was found to exist over wide compositional ranges in both lithia-rich and lithia-poor regions. The degree of the defectiveness of the structures affected the transformation rates. The transformation process is diffusion controlled and required a small activation energy. Insufficient evidence was obtained to resolve the question of the type of change that occurs. (Author)

AD-431 193 Div. 25
OTS price $1.00

Massachusetts Inst. of Tech., Cambridge.
KOSSEL STUDIES OF IRON WHISKERS.
Rept. for 15 May 62-14 Oct 63,
by William G. Morris and R. E. Ogilvie. Jan 64, 33p.
Contract AF33 657 8906, Proj. 7353, Task 735304
RTD TDR63 4198 Unclassified report

Report on Characterization of Solid Phase and Interphase Phenomena in Crystalline Substances.

Descriptors: (*Iron, Crystal structure), (*Filaments, Crystal lattices), (*Single crystals, Crystal lattice defects), X-ray diffraction analysis, Electron beams, X-ray photography, Crystal growth.

The application of Kossel line techniques to the crystallographic study of filamentary growths of iron was demonstrated. The ability to investigate very small regions of a crystal lattice proved to be extremely advantageous since this allows one to study in detail different portions along the axis of an iron whisker. Thermal gradients, which are the result of heating by the electron beam used to excite the X-ray source, can be detrimental to obtaining good patterns from whiskers less than 5 microns in thickness. (Author)

Division 26 - PRODUCTION AND MANAGEMENT

26. PRODUCTION AND MANAGEMENT

AD-429 410 Div. 26, 31
OTS price $3.60

Air Reduction Co., Inc., New York.
YIELD STRENGTH FILLER METALS AND WELDING PROCEDURES.
Status rept.,
by Karl E. Dorschu and Craig R. Sibley. 2 Jan 64, 1v. Rept. no. PD64 201
Contract NObs88540, Proj. SR007 01 01, Task 853
Unclassified report

Descriptors: (*Submarine hulls, Welds), (*Welds, Welding rod), (*Welding, Machine shop practice), Mechanical properties, Wire, Manganese, Nickel, Chromium, Arc welding, Controlled atmospheres, Gases, Argon, Oxygen, Carbon dioxide, Helium, Fracture)(Mechanics), Coatings, Carbon, Silicon, Molybdenum, Phosphorus, Sulfur, Power supplies, Electric currents, Electric potential, Penetration, Heat treatment.

This report reviews the status of (1) the MIG and covered-electrode filler-metal development, and (2) the joining techniques development to date. In the study of the effects of major alloying elements on the properties of MIG weld metals, serious cracking problems were encountered. In the first group of welding wires the problems were traced to carbon levels which were greater than those anticipated from ingot analyses. Experimental covered electrodes of fifteen compositions have been made and six weld metals have been deposited in joints. In addition, a covered-electrode coating study is underway. Work in joining techniques has been directed toward a study of the parameters of the dip-transfer process. The pertinent electrical characteristics of the power supply used in this program have been measured. A number of gases have been screened as to their applicability for use with this process. (Author)

AD-429 750 Div. 26, 22
OTS price $1.60

Springfield Armory, Mass.
A PRELIMINARY STUDY OF A METHOD OF STRETCH-STRAIGHTENING GUN BARRELS FOR SMALL ARMS,
by J. R. Eves. 7 June 63, 11p.
SA TRI7021 Unclassified report

Descriptors: (*Gun barrels, Stretch forming), Stresses, Small arms, Manufacturing methods, Material forming, Feasibility studies, Tensile properties, Test equipment, Test methods.

The feasibility of straightening barrels for small arms by axially stretching these barrels was investigated. A standard tensile testing machine was used to apply the axial loading. This method of stretch-straightening is useful for all small arms barrels with particular emphasis on barrels having a length-to-bore ratio larger than 100 to 1. Test procedure is described, and results are discussed. (Author)

AD-429 825 Div. 26, 17
OTS price $1.60

General Dynamics, Fort Worth, Tex.
THE COMPRESSION AND DEFORMATION OF LEAD SPHERES IN THE UNIRAM TETRAHEDRAL ULTRAHIGH PRESSURE DEVICE,
by R. D. Potter. 15 July 63, 13p. Rept. no. ERR FW211
Contract AF33 657 11214
Unclassified report

Descriptors: (*High-pressure research, Lead), (*Metal forming presses, High-pressure research), (*Lead, High-pressure research), Spheres, Extrusion, Deformation, Compressive properties.

Small, lubricated lead shot was placed in close packed layers in the UniRam and pressed to 52 kilobars pressure. The lead spheres were deformed into dodecahedrons which revealed the uniformity of compressive and flow mechanisms in tetrahedron samples. The results indicate that overall uniformity is chiefly dependent upon alignment and symmetry of sample and anvils. Also indicated is that extruded webs are established from material along the edges and corners of the sample tetrahedron early in the pressurization cycle and that such samples would be best when preformed with webs in place. (Author)

AD-429 970 Div. 26
OTS price $9.60

RAND Corp., Santa Monica, Calif.
AN EXPERIMENTAL INVESTIGATION OF PRIORITY ASSIGNMENT IN A JOB SHOP,
by R. W. Conway. Feb 64, 104p. Rept. no. RM3789PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Queueing theory, Management engineering), (*Management engineering, Queueing theory), (*Job analysis, Measurement), (*Personnel management, Performance tests), Simulation, Digital computers, Tables, Maintenance, Scheduling, Models (Simulations).

The study principally concerns a discipline in which, at each point of decision, the job with the shortest processing time from among those available for assignment is chosen. Such a procedure is known to have optimal properties for certain simple, small-dimensional systems. It is shown in this study to be of dominating importance in networks as well. Regardless of the measure of performance, the simple version of this discipline is among the best procedures of the many tested. Moreover many variations of the basic discipline, and combinations with other disciplines are exhibited, demonstrating the possibility of designing an appropriate discipline for any stated measure of performance. The magnitude of the difference in performance between this shortest-operation discipline and the nominal standards of comparison--such as ''first-come-first-served'' or ''random'' selection--depends upon the particular measure of performance and such conditions as the level of utilization in the system, but factors of two or more are frequently displayed. (Author)

AD-430 124 Div. 26, 17
OTS price $1.60

General Dynamics/Fort Worth, Tex.
DOUBLE REVERSE CORRUGATION CORE (DRC),
by C. W. Rogers and J. M. Hayes. 10 May 63, 14p.
Rept. no. EER FW197
Contract AF33 657 11214
Unclassified report

Descriptors: (*Sandwich panels, Aluminum alloys), (*Honeycomb core, Aluminum alloys), (*Aluminum alloys, Sandwich panels), Shear stresses, Compressive properties, Mechanical properties, Bonding, Adhesives.

The objective of the test procedure was to determine the relative strength properties of double reversed corrugated aluminum core with respect to aluminum honeycomb core of the same density. Two panels of 3.94 lb/cu ft core made from .005 inch gage 2024 aluminum and two panels of 6.83 lb/cu ft core made from .010 inch gage 2024 aluminum were used in this testing. These panels were cut into smaller pieces and fifty-three specimens were used. The results showed that the subject core had approximately 40-60% of the strength properties of the reference core. The modulus properties of the subject core were closely related to the method of attachment of core-to-skin bond. Further design work and testing is recommended for the double reversed corrugated aluminum core. (Author)

AD-430 229 Div. 26, 17
OTS price $14.50

General Dynamics/Fort Worth, Tex.
EFFECTS OF ANDROFORMING ON MATERIAL PROPERTIES.
Final rept., 1 May 61-18 June 63,
by C. D. Lantz and R. L. Jones. Nov 63, 215p.
Contract AF33 600 42847, MMP Proj. 7 910
RTD TDR63 7 910 Unclassified report

Descriptors: (*Stretch forming, Machines), (*Sheets, Materials forming), (*Metal plates, Materials forming), Metal forming presses, Nomographs, Thickness, Aluminum alloys, Stainless steel, Titanium alloys, Mechanical properties, Cold-working, Heat treatment, Statistical analysis, Theory, Operation.

The sheet metal forming parameters of the Model J Androform machine were established for various aluminum, stainless steel and titanium alloys in gages of 0.010 to 0.375 inches. Nomographs were derived for selecting parts that can be Androformed and for determining the machine settings required to form the part. Forming limits established for the various materials showed the machine to be limited to parts having relatively shallow contours. Mechanical property tests, in nearly all cases, showed that Androforming strengthened the material through cold working, with a slight decrease in ductility. In general, the Androform operation had minor effect on the material properties. (Author)

AD-430 259 Div. 26, 30, 5
OTS price $3.60

System Development Corp., Santa Monica, Calif.
COSTS ASPECTS OF COMPUTER PROGRAMMING FOR COMMAND AND CONTROL,
by Leonard Farr and Burt Nanus. 13 Jan 64, 26p.
Rept. no. SP1372 000 01
Unclassified report

Supersedes rept. no. SP 1372.

Descriptors: (*Programming (Computers), Management engineering), (*Management engineering, Programming (Computers)), (*Programming (Computers), Command and control systems, Economics, Costs, Computers.

This report describes one aspect of an ARPA-sponsored project to develop improved management techniques for computer programming in command and control systems--the problem of cost estimation. The report states that although cost estimation is an important prerequisite for effective programming management, program estimates have historically been very unreliable. It discusses some of the underlying causes of the cost estimation problem and identifies about fifty factors that appear to contribute to cost. The report gives some data concerning the effects of some of the factors upon cost. (Author)

AD-430 287 Div. 26, 14, 17
OTS price $7.60

SKF Industries Inc., Philadelphia, Pa.
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
Progress rept. no. 8, 22 June-22 Sep 63.
22 Sep 63, 73p. Rept. no. AL64T003
Contract NOw61 0716C
Unclassified report

Descriptors: (*Roller bearings, Lubrication) (*Ball bearings, Lubrication), (*Lubrication, Roller bearings), Tracer studies, Electrical conductance, Friction, Fatigue (Mechanics), Failure (Mechanics), Steel, Lubricants, Viscosity, Test methods, Velocity, Hydrodynamics, Mathematical analysis, Tables, Wear resistance.

Rolling 4-ball endurance, conductivity and wear tests were continued. Radiotracer wear data were obtained at low speed (2500 rpm) endurance test conditions. Conductivity tests were also performed at this and adjacent speeds. For both test series, a blended Primol-decalin lubricant with 15.4 cs. viscosity at 34 C. was used. Asperity contacts are not maintained through this oil at 2500 rpm once the balls have been thoroughly run-in. For this reason, a thinner oil is being blended and will be used. In low speed tests, an excessive number of orbiting-ball failures occurred. All future tests will be conducted using acid open-hearth steel as orbiting ball material. (Author)

AD-430 300 Div. 26, 30
OTS price $5.60

Research Labs. for the Engineering Sciences, U. of Virginia, Charlottesville.
APPLICATION OF HIGH ROTATIONAL SPEED TECHNIQUES TO THE MEASUREMENT OF ADHESION OF DEPOSITED FILM.
Final rept.,
by William H. Dancy, Jr. Aug 63, 53p.
Rept. no. EP3334 101 63U
Contract DA36 034ORD3584RD
Unclassified report

Supersedes rept. no. EP4448 101 63U.

Descriptors: (*Electroplating, Chromium), (*Chromium, Plating), (*Adhesion, Chromium), Steel, Heat treatment, Bonding, Metal coatings, Solutions, Sulfates, Chromates, Ions, Test equipment, Centrifuges, Oscillators, Magnet coils.

Experimental work was carried out to investigate the effect on the adhesion of chromium deposited on high strength steel substrate when both the chromium and the sulfate content of the plating bath are varied. Both 400 and 500 g/l chromate plating solutions were investigated over the complete range that would give satisfactory coating when the plating solution was operated at 55 C. Work was also carried out to determine the effect on the adhesion of chromium to high strength steel when the plated article was subjected to heat treatment at temperatures higher than the drawing temperature of the steel

substrate. Adhesion values were obtained by means of the high speed spinning rotor technique. In this technique, plated rotors are accelerated until the centrifugal force experienced by the coating is sufficient to overcome the adhesive bond between the coating and the substrate. (Author)

AD-430 303 Div. 26, 14
OTS price $2.60

Beryllium Corp., Reading, Pa.
PRODUCTION ENGINEERING MEASURE FOR BERYLLIUM OXIDE AND PARTS PRODUCED FROM IMPORTED ORES.
Quarterly progress rept. no. 1, 1 July-30 Sep 63,
by J. F. Blum. 30 Sep 63, 23p.
Contract DA36 039AMC01481E
Unclassified report

Descriptors: (*Beryllium compounds, Preparation), (*Oxides, Beryllium compounds), Powders, Ores (Metal sources), Solvent extraction, Crystallization, Sintering, Electronic equipment, Processing.

A batch of 100 lbs of high purity beryllium oxide control powder was produced to initiate the first phase of the contract. A mix for electronic parts was prepared from a portion of the control powder. Test and qualification samples are being fabricated from the mix. All tooling required for piece fabrication is on hand. (Author)

AD-430 304 Div. 26
OTS price $1.60

System Development Corp., Santa Monica, Calif.
THE MODELING OF MANAGEMENT CONTROL,
by J. Kagdis and M. R. Lackwer. 30 Dec 63,
15p. Rept. no. SP1213
Unclassified report

Descriptors: (*Management engineering, Models (Simulations)), (*Models (Simulations), Management engineering), Simulation, Specification, Design, Test methods, Control.

This report describes several examples of the application of models of the management of a system in producing digital simulation models. An object system is viewed as a coherent assemblage of activities, performers of activities, logical situations, and transient entities. When interacting activities are performed at different times or at different rates, objects or information exchanged may form queues. Management control is exerted via activities which restructure segments of the system by defining other activities or modify system behavior through queue discipline and allocation of activity performers. The system of relative categories used inmodeling an object system produces a representation in which control sensitivity and control exertion are clearly expressed. Management control is best considered an identifiable characteristic of activity, and that either people or machines may perform such activity. The difficulties of modeling management control are the difficulties of articulating activity specifications and thus are essentially the same difficulties encountered in automating other functions. (Author)

AD-430 309 Div. 26, 17
OTS price $4.60

General Electric Co., Schenectady, N. Y.
EXTRUDING AND DRAWING MOLYBDENUM TO COMPLEX THIN H-SECTION.
Interim technical engineering rept. no. 2, 1 Oct-31 Dec 63,
by P. A. Santoli. Jan 64, 42p.
Contract AF33 657 11203, RTD Proj. 8 112
RTD TR8 112 Unclassified report

Descriptors: (*Molybdenum alloys, Materials forming), (*Materials forming, Extrusion), Drawing (Machine processing), Dies, Ceramic coatings, Ceramic materials, Flame spraying, Titanium alloys, Zirconium alloys, Tool steel, Zirconium compounds, Oxides, Microstructure, Surface properties.

Sixteen solid round extrusions of TZM were made primarily to determine suitable die materials. Reduction ratios at 45:1 and 55:1 were accomplished from a billet heating temperature range of 3000F to 3500F. Extrusion dies were prepared with flame-sprayed zirconia deposits on AISI H-13 tool steel and with pressed and sintered solid zirconia nibs. Good extrusion results were obtained with the use of 0.025 and 0.035-in. sprayed zirconia at a reduction ratio of 45:1. Extrusions at 55:1 were poor regardless of sprayed coating thickness and billet heating temperature. Good extrusion results were also obtained with pressed and sintered solid zirconia nibs at a reduction ratio of 45:1. Extrusion tooling performed well up to 237,000 psi liner pressure except for noticeable wear which occurred at the liner working surface. On the basis of good surface quality and dimensional runout on round extrusions, H-shaped dies will be prepared with 0.035-in. flame-sprayed zirconia as well as with pressed and sintered solid zirconia. (Author)

AD-430 519 Div. 26, 8
OTS price $2.60

Midland Mfg. Co., Inc., Kansas City, Kans.
CR-(XM-44)/U MODERATE PRECISION GLASS ENCLOSED CRYSTAL UNITS.
Quarterly progress rept. no. 5, 1 Apr-30 June 63,
by Chet Rutkowski and Melvin O. Hammer.
30 June 63, 22p.
Contract DA36 039SC86717
Unclassified report

Descriptors: (*Crystals, Quartz), (*Crystal holders, Bonding), (*Bonding, Crystal holders), (*Quartz, Crystals), Manufacturing methods, Plating, Electroplating, Electrodes, Gold, Glass seals, Silver, Nickel.

The construction and assembly of the second glass holder sealing equipment was completed, and is working satisfactorily. Sealing experiments were conducted, and the numerous problems in achieving a satisfactory bulb to base seal were solved. Fabrication of the first engineering samples is in process. (Author)

AD-430 644 Div. 26
OTS price $1.60

Aeroprojects Inc., West Chester, Pa.
DEVELOPMENT OF ULTRASONIC WELDING EQUIPMENT FOR REFRACTORY METALS.
Interim technical progress rept., Oct-Dec 63,
by Nicholas Maropis. Jan 64, 20p.
Contract AF33 600 43026, Proj. 7 888
ASD TR7 888, pt. VII Unclassified report

Descriptors: (*Ultrasonic radiation, Welding), (*Welding, Machines), (*Refractory metals & alloys, Welding), Design, Transducers, Power supplies, Metal plates, Electromechanical converters, Material forming.

Design, development, and construction of the 25-kilowatt spot-type ultrasonic welding machine continued. Emphasis was placed on performance evaluations of both the modified tension-shell ceramic transducer and the single-element example of the overhung-coupler geometry with its present mechanically replaceable welding tip. Liaison efforts associated with expediting delivery of the motor-alternator power source were conducted, and control system components were incorporated into the welder frame. The four-wafer unbonded ceramic transducer was driven at its design power (a maximum of 3.4 kilowatts) without the former arc-over difficulties, and there was no evidence of untoward unit or circuitry failure. (Author)

AD-430 680 Div. 26
OTS price $8.10

Operations Analysis Office Air Force, Washington, D. C.
THE AFLC MATERIEL REPAIR SYSTEM,
by Ned A. Diehl and Irving Katz. Feb 64, 83p.
OAOAF R3 Unclassified report

Descriptors: (*Maintenance, Engineering), (*Engineering, Maintenance), Job analysis, Operation, Analysis, Military requirements, Costs, Tables, Labor, Man, Production, Measurement, Management engineering.

The Directorate of Maintenance Engineering requested that a study of the Fiscal Year 1962 Air Force Materiel Repair System (MRS) be conducted. This study was a follow-up to two previous studies conducted by the Operations Analysis Office. It found that overall requirements were still greatly overstated, causing excess repair to be accomplished, while requirements for carcass-limited items were still too low to expedite properly the repair of these items. Considerable maldistribution was also found to be present. A more optimistic finding was that requirements for the items with large workloads were much better than for other items. Techniques for the improvement of the adverse conditions are presented. Although delayed, this documentation of FY 62 status should serve as an important benchmark against which to compare future status. (Author)

AD-430 905 Div. 26, 14, 12
OTS price $.75

Ohio State U. Research Foundation, Columbus.
NONDESTRUCTIVE SYSTEM FOR INSPECTION OF FIBER GLASS REINFORCED PLASTIC MISSILE CASES AND OTHER STRUCTURAL MATERIALS.
Quarterly technical rept. no. 6, 29 Sep-28 Dec 62, by Robert C. McMaster, Merle L. Rhoten and Jay P. Mitchell. 1 Feb 63, 25p.
Contract DA33 019ORD3670, Projs. 5010 11 808, 5B93 32 004
WAL TR142 5 2 6 Unclassified report

Descriptors: (*Non-destructive testing, Television cameras), (*X-ray photography, Photographic images), Instrumentation, Quality control, Guided missile components, Airframes, Laminated plastics, Reinforcing materials, Glass textiles, Plastics, Tapes, Graphite, Aluminum, Welds.

A slow-scan television system is being used to produce X-ray images. A standard audio-frequency magnetic tape recorder has been used to record the slow-scan video signal with considerable success. This initial work proves the applicability of using a slow-scan television system in conjunction with an audio-frequency recorder to provide an economical means of recording television X-ray images. The slow-scan equipment requires less radiation quantities to produce useful images than the standard 525 line, 30 frame per second rate equipment. The use of the television X-ray equipment as a means of inspecting fiber glass missile case materials is evaluated. The system appears to be an accurate method of visualizing discontinuities that offer a density difference. For the inspection of weldments in aluminum in the order of 1 inch in thickness, a 2-inch television camera is under construction. This camera is being designed and constructed to accommodate a 2-inch X-ray-sensing television camera tube. (Author)

27. PROPULSION SYSTEMS

AD-429 401 Div. 27, 26
OTS price $1.60

Aerojet-General Corp., Sacramento, Calif.
INVESTIGATION OF FILAMENT-WINDING PATTERNS,
Bimonthly rept. no. 4, 24 Oct-24 Dec 63.
31 Jan 64, 6p. Rept. 0627I4
Contract NOw63 0627c
Unclassified report

Descriptors: (*Rocket cases, Filament wound construction), (*Filament wound construction, Design), Pressure vessels, Hydrostatic pressure, Tests, Mechanical properties, Stresses, Experimental data, Deformation, Plastics.

A program was conducted to increase the understanding of the interrelation between chamber winding patterns and chamber behavior. All ten chambers required for Phase I of this program have been fabricated. Seven of the units were hydrostatically tested, and the data were analyzed. Evaluation of the developed analytical approach relating to deformation control of isotensoid head shapes was initiated. (Author)

AD-429 467 Div. 27, 17
OTS price $2.60

Calorobic Materials, Inc., Pearl River, N. Y.
DEVELOPMENT AND UTILIZATION OF OPTIMUM TECHNIQUES FOR THE FABRICATION OF TITANIUM BORONITRIDE ROCKET NOZZLES.
Interim rept. no. 1, 1 Jan-30 June 63,
by R. Strickman. July 63, 24p. TR371 9 6
Contract DA30 069ORD3747, DA proj. 59332008
Unclassified report

Descriptors: (*Rocket motor nozzles, Manufacturing methods), Refractory materials, Titanium, Boron compounds, Nitrides, Nozzle inserts, Powder metals, Tests, Titanium compounds, Test equipment.

Various test specimens and rocket nozzle inserts were produced of various throat diameters from a material composed principally of titanium diboride, titanium nitride and boron nitride. The scope of this project is to develop optimum techniques for fabricating sound, dense, crack-free specimens and rocket nozzle inserts in specified sizes of the material system - Titanium, Boron, Nitrogen. (Author)

AD-430 279 Div. 27
OTS price $1.60

Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md.
AGE LIFE STUDY OF X248 AND X254 MOTORS AND FIRING X254 MOTOR S/N F-25,
by M. B. Rubin and J. DeGiovanni. Feb 64, 16p.
Contract AF04 695 64 161
SSD TDR64 56 Unclassified report

Descriptors: (*Rocket motors, (Solid propellant), Aging (Materials)), Captive tests, Storage, Life expectancy, Interior ballistics, Performance (Engineering), Pressure, Temperature.

Data from a successful static firing of Rocket Motor X254, F-25, after 26 months of storage and performance histories of X248 and X254 rocket motors successfully fired after storage periods in excess of 18 months are reported. These data are used as a basis for recommending that the current service life (18 months) of X248 and X254 motors be extended to 36 and 24 months, respectively. (Author)

AD-430 285 Div. 27
OTS price $4.60

Aerojet-General Corp, Sacramento, Calif.
WEAPON SYSTEM 107A-2 PRODUCT ENGINEERING PROGRAM. COATED METALLIC THRUST CHAMBERS EXPANDABLE NOZZLES, COMBUSTION INSTABILITY SCALING CONCEPTS ABLATIVE THRUST CHAMBERS.
Monthly progress rept., 1-31 Jan 64.
15 Feb 64, 48p. Rept. no. 212SA3 2 2M6
Contract AF04 694 212
Unclassified report

Descriptors: (*Rocket motors (Liquid propellant), Combustion chambers), (*Combustion chambers, Metal coatings), Regenerative cooling (Rockets), Tungsten, Zirconium compounds, Oxides, Scheduling, Thermal stresses, Tests, Rocket motor nozzles, Combustion, Stability, Ablation, Refractory coatings, Film cooling.

Contents: Coated Metallic Thrust Chambers; Expandable nozzles; Combustion Instability Scaling Concepts; Ablative Thrust Chambers.

AD-430 369 Div. 27, 22, 1
OTS price $8.10

Ammunition Development Div., Picatinny Arsenal, Dover, N. J.
STATIC TESTING OF THE XM-15 CATAPULT ROCKET,
by Frank C. Femia and Henry A. Pontious.
Dec 63, 82p.
PA TM1344 Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Jettisonable cockpits), (*Jettisonable cockpits, Rocket motors (Solid propellant)), Captive tests, Ignition, Thrust, Reliability, Catapults, Solid rocket propellants, Instrumentation, Misalignment.

Twenty-eight static test firings were conducted with the XM-15 catapult rocket. The test program included ignition studies, static functioning tests to determine reliability and performance levels, and static functioning tests to investigate thrust magnitude and misalignment in one plane. Data obtained from the test program showed typical regressive burning characteristics with the motor burning for approximately 0.5 sec, to produce a maximum thrust of 42,000 lbs and a total impulse of approximately 17,200 lb sec. Thrust misalignment data averaged from -4 to +7 minutes, with a maximum of +14 minutes for a total of six firings. Two motors were preconditioned at +90 F. The balance of twenty-six motors were preconditioned at +70 F. before firing. The measured ballistics and overall static test performance data are presented. (Author)

AD-430 482 Div. 27
OTS price $4.60

Aerospace Corp., Los Angeles, Calif.
GENERAL RESEARCH. ELECTRON BOMBARDMENT HEATING FOR ELECTROTHERMAL PROPULSION,
by K. E. Starner and W. R. Grabowsky. 3 Feb 64, 49p. Rept. no. ATN64 9227 3
Unclassified report

Descriptors: (*Electric propulsion, Electron bombardment), (*Electron bombardment, Space propulsion), Heating, Heat transfer, Argon, Heat exchangers, Supersonic nozzles, Gas-generating systems, Specific impulse, Refractory materials, Heaters, Arc-jet engines, Spacecraft.

Electrothermal propulsion devices developed to date can be grouped into two classifications, namely, the arc jet and the electrical resistance heated heat transfer propulsor. The former type features Joule heating directly in the gas; in the latter, a resistance heated refractory metal heat exchanger transfers heat to the propellant by conduction. This report introduces the technique of high-voltage, low-current electron bombardment heating for the heat transfer thrustor. The electron bombardment approach has inherent advatages for space applications and allows lifting of several restrictions found with resistance heating methods. A tantalum, electron bombardment type gas heater was built to research thrustor operation. Steady-state gas temperatures to 2700K were produced with argon at a voltage-to-current ratio greater than 50. The device functioned successfully for a total operating time of approximately 50 hours. (Author)

AD-430 525 Div. 27
OTS price $11.00

Foreign Tech Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AUTOMATIC CONTROL OF AIRCRAFT ENGINES (Avtomaticheskoye Regulironvaniye Aviadvigateley).
3 Dec 63, 141p.
FTD TT63 745 Unclassified report

Trans. from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stov Oborongiz, no. 4, pp. 5-69 and 95-135, 1962.

Descriptors: (*Airplane engines, Control systems), Heat exchangers, Mathematical analysis, Heat transfer, One-dimensional flow, Atmosphere models, Turbulence, Automatic, Turbojet engines, Afterburners, Timing devices, Acceleration, Gas turbines, Life expectancy, Fuel systems, Fuel injectors, Turbopropellar jet engines, Thrust reverse, Spray nozzles.

Contents: Dynamic Characteristics of a Tubular Heat Exchanger; Simulation of Random Disturbances of a Turbulent Atmosphere; The Operation of an Air-intake and its Control System in a Perturbed Atmosphere; Certain Very Simple Timing Regulators Ensuring Acceleration of a turbojet engine with Respect to Reduced Parameters; Reliability and Increase in the Working Life of the Control and Fuel-supply Equipment of Gas-turbine Engines; Investigation of the Control Dynamics of a Turboprop Engine with a Negative-thrust Limiter; and Certain Features of Pressure Jet Atomizers of a Gas-turbine Engine.

AD-431 007 Div. 27, 12, 26
OTS price $3.60

Space Systems Div., Air Force Systems Command, Inglewood, Calif.
PROGRAM 624A. MAINTENANCE ANALYSIS PROGRAM SPECIFICATION.
1 Nov 62, 38p.
SDD 62 170 Unclassified report

Descriptors: (*Launch velicles (Aerospace), Maintenance, Management engineering, Specifications, Scheduling, Data, Instruction manuals, Acceptability, Maintenance equipment.

This specification establishes the detailed Maintenance Analysis Program for Program 624A, which is conposed of the following functions: (1) the preparation and maintenance of integrated maintenance analyses Electronic Accounting Methods (EAM) and manual reports; (2) the analysis of data furnished by agencies other than associate contractors; (3) the verification of overall system maintenance compatibility through study of the maintenance analysis data furnished by the other associate contractors; (4) the integration of self-generated maintenance analysis data with that provided by the other associate contractors and the submission of the whole to SSD/Aerospace and/or other affected contractors or agencies upon request; (5) participation in meetings called by SSD/Aerospace for the discussion of maintenance analysis matters; and (6) the convening and conduct of meetings with other associate contractors as necessary to the accomplishment of the Program 624A Maintenance Analysis Program.

AD-431 109 Div. 27, 26, 30, 33, 12
OTS price $2.60

Space Systems Div., Air Force Systems Command, Inglewood, Calif.
PROGRAM 624A. PROGRAM DOCUMENTATION REQUIREMENTS GENERAL SPECIFICATION.
1 Nov 62, 25p.
SSD 62 163 Unclassified report

Descriptors: (*Launch vehicles (Aerospace), Documentation), Military requirements, Specifications, Acceptability, Test methods, Configuration, Scheduling, Handling, Transportation, Research program administration.

This specification establishes the program data, documentation, reports and other basic requirements to be used in the accomplishment of Program 624A, Standard Space Launching System (SSLS). This specification is applicable to all associate contractors selected for participation in Program 624A. (Author)

AD-431 151 Div. 27, 12, 16
OTS price $2.60

Space Systems Div., Air Force Systems Command, Inglewood, Calif.
PROGRAM 624A. PERSONNEL SUBSYSTEM REQUIREMENTS GENERAL SPECIFICATION.
1 Nov 62, 22p.
SSD Unclassified report

Supersedes Issue of 1 July 1962.

Descriptors: (*Launch vehicles (Aerospace), Military training), (*Guided missile personnel, Training), Military requirements, Human engineering, Personnel management, Test methods, Design, Tests, Military personnel.

The general requirements are established for design, development and test of a military personnel subsystem to produce military personnel qualified to operate, maintain, and control the 624A Standard Space Launch System (SSLS). (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-429 434 Div. 28
OTS price $1.60

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
EFFECTIVE INDIVIDUAL PERFORMANCE IN SMALL ANTARCTIC STATIONS. A SUMMARY OF CRITERION STUDIES,
by Paul D. Nelson and E. K. Eric Gunderson.
April 63, 13p.
Task MR005 12 2004
NMNRU 63 8 Unclassified report

Descriptors: (*Military psychology, Behavior), (*Personnel, Behavior), (*Behavior, Military psychology), Standards, Adjustment (Psychology), Personality, Analysis, Military personnel, Measurement, Human engineering.

This study was undertaken for the purpose of developing a criterion measure of effective individual performance for personnel who winter-over at small antarctic stations. The best single criterion is a standard score based upon the combination of peer and supervisor choices of individuals with whom they would most prefer to return for further small station duty were they to return to the antarctic. The standard score is based upon an average T-score (Mean equals 50, SD equals 10) derived from rank data. The criterion score can be quickly derived and can be used appropriately when personnel from different stations and years are pooled. Specific qualities of behavior considered to have greatest face validity as attributes of effective performance were emotional composure, ability to get along with others, and work efforts. Data obtained from supervisor and peer evaluations, 3 behavior characteristic clusters were derived, which represented the aforementioned 3 attributes of effective performance and contributed the greatest amount of variance to the criterion measure of all evaluations available. (Author)

AD-429 459 Div. 28
OTS price $.50

Cincinnati U., Ohio.
AN EVALUATION OF BRANCHING AND MOTIVATIONAL PHRASES IN A SCRAMBLED BOOK.
Rept. for Mar-Jul 63,
by R. J. Senter, A. Nieberg, J. S. Abma and R. L. Morgan. Nov 63, 15p.
Contract AF33 657 10234, Proj. 1710, Task 171007
AMRL TDR63 122 Unclassified report

Report on Training, Personnel and Phychological Stress Aspects of Bioastronautics.

Descriptors: (*Motivation, Learning), (*Teaching machines, Learning), Effectiveness, Errors, Tables, Time, Analysis of variance, Computer logic, Text books, Arithmetic progressions, Mathematics.

This study evaluated three experimental versions of the scrambled text ''The Arithmetic of Computers'' by Norman A. Crowder. The three versions were: (1) Unmodified, (2) Modified by deletion of motivational phrases, and (3) Straight Line having neither motivational phrases nor branching. Results showed no significant differences in amount learned or in study time. (Author)

AD-429 827 Div. 28, 16
OTS price $1.60

Civil Aeromedical Research Inst., Oklahoma City, Okla.
THE PERCEPTION OF DEPTH FROM BINOCULAR DISPARITY,
by Walter C. Gogel. May 63, 10p.
CARI 63 10 Unclassified report

Descriptors: (*Perception, Psychology), (*Binoculars, Effectiveness), Acuity, Visual acuity, Depth finding.

This study was concerned with the factors involved in the perception of depth from a binocular disparity. A binocularly observed configuration of constant convergences, constant visual size, and having constant binocular disparities was made to appear at two different distances in a monocularly observed field-of-view. Both the perceived frontoparallel sizes and the perceived depth within the configuration were measured by means of a kinesthetic (hand) adjustment. It was found that the perceived frontoparallel size and the perceive depth in the binocularly observed configuration increased as the perceived distance of the configuration increased. It is concluded that the perceived depth resulting from a constant binocular disparity will differ depending upon the perceived size per unit of visual angle of frontoparallel extents in its depth vicinity. (Author)

AD-429 838 Div. 28
OTS price $1.10

Vermont U., Burlington.
THE RECOGNITION OF COMPLEX STIMULI,
by Frank Warhurst and Bennet B. Murdock, Jr.
1 Mar 62, 8p.
Contract Nonr3219 02x
Unclassified report

Descriptors: (*Vision, Stimulation), (*Pattern recognition, Visual acuity), Color, Errors.

The purpose of the present experiment was to determine how accurately observers could recognize complex stimuli, either colored cross-hatched forms or three-digit numbers. The general procedure was that used by Shepard and Teghtsoonian (J. exp. Psychol., 1961, 62, 302-309) where Ss went through a deck of cards containing the stimuli and judged whether or not they had seen each particular card before. Each specific stimulus item (i.e., form or number) occurred twice in a deck with anywhere from 0 to 15 other stimuli intervening between successive presentations. There were significantly more false positives with figures than with numbers, but otherwise the two types of stimuli were recognized with about equal accuracy. Thus, it would appear that under these conditions the recognition of numbers is somewhat more accurate than the recognition of colored, cross-hatched forms. (Author)

AD-429 839 Div. 28
OTS price $1.10

Vermont U., Burlington.
THE RECOGNITION OF TRI-DIMENSIONAL VISUAL STIMULI,
by Frank Warhurst and Bennet B. Murdock, Jr.
22 Jan 62, 8p.
Contract Nonr321902x
Unclassified report

Descriptors: (*Vision, Stimulation), (*Stereoscopic display system, Vision), (*Pattern recognition, Visual acuity), Errors, Colors.

The purpose of this experiment was to determine how accurately observers could recognize tridimensional visual stimuli. Each stimulus varied in three dimensions: form, color, and crosshatching. There were in all 10 different forms, 10 different colors, and 4 different crosshatchings. A tri-dimensional stimulus was therefore a colored, crosshatched form. For each list a critical stimulus was presented for inspection and study, then followed by 80 test stimuli. For each of the 80 test stimuli Ss had to judge whether its form, color, and crosshatching was or was not the same as the form, color, and crosshatching of the critical stimulus. There were 2 lists on each of 4 days. While the recognition of color was considerably poorer than form or crosshatching, overall the recognition accuracy was high; the average error rate was only 3.4%. (Author)

AD-429 858 Div. 28, 16
OTS price $10.50

Lockheed Aircraft Corp., Marietta, Ga.
HUMAN GROUP PERFORMANCE DURING CONFINEMENT,
Final rept.,
by Earl A. Alluisi, Thomas J. Hall, Glenn R. Hawkes and W. Dean Chiles. Nov 62, 32p. Rept. no. ER6024
Contract AF33 616 7607M4
Unclassified report

In cooperation with 6570th Aerospace Medical Dev., Wright-Patterson Air Force Base, Ohio.

Descriptors: (*Aviation personnel, Scheduling), Feasibility studies, Control systems, Pilots, Performance tests, Selection, Motivation, Effectiveness.

The purpose of this study was to investigate the feasibility of using a work-rest schedule of 4-hours-on-duty and 2-hours-off relative to using a 4-on and 4-off schedule in the operation of advanced aerospace systems. Six Air Force Academy Cadets were confined for 15 days in a simulated advanced-system crew compartment while following the 4-2 schedule, and two 5-man crews of USAF Pilots were confined for 30 days while following the 4-4 schedule. With proper control of selection and motivational factors, crews can work effectively for periods of at least two weeks and probably longer using a work-rest schedule of 4-hours-on-duty and 2-hours-off. With less demanding controls of selection and motivational factors, crews can work even more effectively for periods of at least a month and quite probably for 2 or 3 months using a schedule of 4-hours-on-duty and 4-hours-off. (Author)

AD-429 908 Div. 28
OTS price $1.60

Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
BIOGRAPHICAL INDICATORS OF ADAPTATION TO NAVAL SERVICE,
by E. K. Eric Gunderson. Nov 63, 13p.
NMNRU 63 19, NAVMED MR005 12 2004
Unclassified report

Descriptors: (*Naval personnel, Adjustment (Psychology)), (*Personality, Adjustment (Psychology)), (*Military psychology, Naval personnel), Sociology, Military training, Costs, Standards, Behavior, Medical personnel, Management engineering, Personnel management.

Biographical and test information were related to four criteria of adaptation to the naval service. The criteria were: disciplinary offense record, military proficiency rating, military conduct rating, and medical record. Biographic items reflecting persistent difficulties in school adjustment, lax of erratic discipline by father, discipline by a person other than father, and lack of family cohensiveness or stability were significantly related to one or more of the adjustment criteria. The results indicated the potential usefulness of biographical data in assessment of military adaptability. (Author)

AD-430 035 Div. 28, 30
OTS price $7.60

Dunlap and Associates, Inc., Stamford, Conn.
MAN-COMPUTER SYSTEMS AND ALLOCATION OF RESOURCES PROBLEMS.
Progress rept. no. 3,
by U. O. Gagliardi, Ira Kaplan and L. L. Vallerie. Jan 64, 72p.
Contract Nonr3602 00
Unclassified report

Descriptors: (*Behavior, Decision making), (*Human engineering, Weapon systems), (*Job analysis, Linear programming), Automation, Mobile, Manned, Computers, Eye, Motion, Automatic, Targets, Mapping, Detection, Performance tests, Cameras, Target recognition, Digital computers, Target discrimination, Data processing systems, Submarines.

The work reported concerns the observation of problem-solving behavior exhibited by subjects who were given an allocation-of-resources task. The task was to deploy Polaris-like weapon systems against a given target system under stated constraints. While the task is formulable as an integer linear programming problem, the subjects solved it by resorting to heuristic procedures. These procedures, as well as the solutions produced, seem to indicate that a problem solver may encounter considerable difficulty in uncovering the ordering of decision alternatives, if this ordering is a partial one. Following the study of unaided performance, two distinct computer-aid concepts were developed and tested. (Author)

AD-430 057 Div. 28
OTS price $1.10

California U., Los Angeles.
FREE RECALL AND ORDERING OF TRIGRAMS,
by Edward C. Carterette. 1 Oct 63, 10p.
Technical rept. no. 14
Contract Nonr233 58
Unclassified report

Descriptors: (*Verbal behavior, Psychology), (*Memory, Psychology), Learning, Psychometrics, Analysis of variance.

To assess the role of intralist similarity in the learning and retention Ss were shown 12 3-consonant trigrams. One list used 4 different letters (L4, high intralist similarity), the other containing 12 different letters (L12, low intralist similarity). 4 groups of 20 Ss were tested; one in free recall, and another learned only the order of the syllables, for each of the L4 and L12 lists. Conclusions were that (a) free recall for L4 was higher than for L12 early in learning but lower on later trials and (b) L12 had uniformly higher ordering scores that L4. (Author)

AD-430 153 Div. 28
OTS price $1.60

Bucknell U., Lewisburg, Pa.
LEVEL OF ASPIRATION AND MOTIVE PATTERNS,
by Carolyn Thomas and Richard C. Teevan. 1964, 15p. Rept. no. TR2
Contract Nonr359101, Proj. NR171 803
Unclassified report

Descriptors: (*Fear, Performance tests), Anxiety, Stress (Psychology), Psychology, Effectiveness, Motivation.

One hundred and five male Ss between the ages of 13 and 15 performed five trials of twenty shots each on a rifle task, answering two LA questions before each trial. Two questions which permitted defensive answers followed the last trial. The hypothesis that fear of failure Ss, as measured by the Hostile Press system, would be more defensive than others was confirmed, as were hypotheses that Ss low in need achievement and high in need affiliation would be more defensive and higher on Hostile Press than would those high on need achievement and low on need affiliation. It was concluded that the data also support the theory that fear of failure individuals may fear the social consequences of failure rather than failure itself. (Author)

AD-430 302 Div. 28
OTS price $1.60

Bucknell U., Lewisburg, Pa.
FEAR OF FAILURE AND RISK-TAKING BEHAVIOR,
by John Hancock and Richard C. Teevan. 1964, 12p. Technical rept. 4
Contract Nonr3591 01, Proj. NR171 803
Unclassified report

Descriptors: (*Motivation, Psychometrics), Anxiety, Fear, Students.

Sixty male sophomore high school students were given both a risk-taking task which was scored according to Atkinson's (1957) model and the TAT which was scored for hostile press according to Birney, Burdick, and Teevan (1960) in an attempt to identify 'fear of failure' persons. A chi square test of significance yielded a value of 4.27, df = 1, which is significant beyond the 5% level of confidence. The Ss making irrational choices on the risk task were high hostile press. Atkinson (1960) hypothesized that 'fear of failure' persons would not go to college, while the present study found that 15 of the 19 Ss who were enrolled in the college preparatory course of study were 'fear of failure'. (Author)

AD-430 405 Div. 28
OTS price $6.60

Institute for Behavioral Research, U. of Maryland, College Park.
CROSS-CULTURAL INVESTIGATION OF SOME FACTORS IN PERSUASION AND ATTITUDE CHANGE,
by Elliott McGinnies. Jan 64, 69p. Technical rept. no. 3
Contract Nonr3720 01, Proj. NR171 250
Unclassified report

Report on Generalization of Persuasion.

Descriptors: (*Attitudes, Sociometrics), (*Motivation, Attitudes), Economics, Political science, Tables, Social communication, Statistical analysis, Psychology, Sociology, Measurement, Test methods, Analysis of variance.

Based upon this general theory of consistency both in the development and the change of attitudes, the prediction was made in the present experiment that a persuasive communication successful in modifying the attitudes of Japanese university students on the cold War, in general, would also influence their attitudes toward the Cuban crisis, in particular. It was also expected that communications directed toward the Cuban situation would induce attitude change that would not generalize significantly to the broader topic of the Cold War. The general prediction was that a persuasive communication that was effective in producing attitude change in a broad target area would result in a generalized attitude change toward a more specific but logically related issue. (Author)

AD-430 406 Div. 28
OTS price $4.60

Bucknell U., Lewisburg, Pa.
FEAR OF FAILURE AND THE ACHIEVEMENT SITUATION,
by Robert C. Birney, Harvey Birdick and Richard C. Teevan. 1964, 50p. Technical rept. no. 1
Contract Nonr359101, Proj. NR171 803
Unclassified report

Descriptors: (*Fear, Abnormal psychology), (*Personality, Achievement tests), Motivation, Social communication, Tables, Behavior, Performance tests, Anxiety, Emotions, Man, Students.

This report has described the development of the HosP scoring system for use with TAT stories written to pictures selected for their failure cue value. On the basis of the work presented here it has been possible to frame a program of research directed to the study of motivation, situation effects on aspiration, and further analysis of the determinants of the fantasy scores. Further study of the scoring system is being conducted, and the first test-retest reliability coefficient (rho) is +.55 over an eight month period for a population of 10th grade males. It is likely that some modification of scoring procedures remains to be done, but we feel that the HosP has now been shown to have essentially the same working characteristics of previous systems of this type, and with proper experimental controls can be used for research into the complexities of achievement-fear of failure relationships. (Author)

AD-430 407 Div. 28
OTS price $1.60

Bucknell U., Lewisburg, Pa.
MEASUREMENT OF FEAR OF FAILURE IN RELATION TO A LEVEL OF ASPIRATION DEFENSE MEASURE,
by Carolyn Thomas and Richard C. Teevan. 1964, 15p. Technical rept. no. 3
Contract Nonr3591 01, Proj. NR171 803
Unclassified report

Descriptors: (*Fear, Measurement), (*Motivation, Achievement tests), Experimental data, Anxiety, Tables.

One hundred and five male Ss between the ages of 13 and 15 performed on the McClelland TAT, the Mandler-Sarason Test Anxiety Questionnaire, and the French Test of Insight. Each was then given five trials of twenty shots each on a rifle task, answering LA questions before each trial. It was found that Ss in the lower and middle thirds of the need achievement distribution were more defensive and scored higher on Hostile Press than the upper third. The Atkinson-

Litwin measure of fear of failure was not significantly related to either the Hostile Press or the discrepancy score measure of fear of failure. It was concluded that there is somewhat more support for the lower third of the nAch distribution as the FF group than for the middle third, but that perhaps neither is actually a valid measure. Perhaps a separate system for measuring fear of failure, such as the Hostile Press system, is necessary. (Author)

AD-430 412 Div. 28
OTS price $6.60

Massachusetts U., Amherst.
INFORMATION PROCESSING UNDER TASK STRESS.
Final rept.,
by Warren H. Teichner. Nov 63, 54p.
Contract AF19 628 290, Proj. 7682, Task 768201
ESD TDR63 657 Unclassified report

Report on Man Computer Information Processing.

Descriptors: (*Data processing systems, Manned), (*Personnel management, Data processing systems), (*Job analysis, Data processing systems), Operation, Input-output devices, Operator (Personnel), Stress (Psychology), Memory, Analysis of variance, Experimental data, Tables, Data, Communication theory.

This is the final report of studies of human information processing related to variables present in high speed systems operations. This report reviews earlier reported data pertinent to the effects of informational input rates and related factors. The report then presents experiments concerned with two other aspects of the problem: (1) the interaction of short-and long-term memories in human data handling, and (2) the effects of presented information rates on subjective information, i.e., the amount of information in the operator's estimate of what is presented by the display. (Author)

AD-430 511 Div. 28
OTS price $3.60

Rutgers U., New Brunswick, N. J.
THE STUDY OF ORGANIZATIONAL AND RELEVANT SMALL GROUP AND INDIVIDUAL DIMENSIONS,
by Bernard P. Indik and F. K. Berrien. Dec 63, 40p. TR13
Contract Nonr404 10
Unclassified report

Descriptors: (*Group dynamics, Behavior), (*Behavior, Measurement), Social communication, Sociometrics, Attitudes, Motivation, Theory, Culture, Sociology, Perception.

This report attempts to develop a taxonomy that will be useful in developing an approach to the integration of studies of individuals in groups which are embedded in organizational settings which themselves are in a sociocultural environment. A classificatory framework is presented which develops seven panels of variables that should be considered. They include two organization level panels - organization structure variables and organization process and function variables; two small group panels - small group structure variables and small group process variables; two individual level panels - organizationally relevant individual attitudes, perceptions, abilities, temperaments and motivations and relevant individual behavior variables; and finally, a panel of variables that is descriptive of the organizational environment. Each panel is defined and the variables within each panel are described in detail in an attempt to approximate a set of classificatory variables consistent within each panel. An attempt was made to have each panel be a set of mutually exclusive variables so they would be clearly discriminable from each other. This was not always possible given our present knowledge. This classificatory schema also suggests hypotheses about relationships between variables in adjacent panels and, suggests what categories of variables should be considered relevant in prediction studies of various organizationally relevant behavioral outcomes. (Author)

AD-430 567 Div. 28
OTS price $1.60

California U., Los Angeles.
THE LEARNING OF CHOICES BETWEEN BETS,
by Morton P. Friedman, Gilbert Padilla and Harold Gelfand. 13 Jan 64, 18p. Technical rept. no. 20
Contract Nonr233 58
Unclassified report

Descriptors: (*Decision making, Game theory), (*Learning, Models (Simulations)), (*Decision making, Learning), Probability, Programming (Computers), Feedback, Linear system.

A choice between bets situation was analyzed in terms of Estes' scanning model. On each trial, the subject was offered a choice between two alternative bets. He was asked to choose the bet which was most likely to win on that trial. Following his choice, feedback was given for both bets. Wins and losses on both bets were programmed independently according to simple non-contingent random schedules. The principal independent variables were the values of the probabilities of wins and losses on the two bets. All pairwise combinations of .8, .5, and .2 were employed, yielding six main experimental conditions. An additional condition was run in which subjects received feedback only for the choice made on each trial. Twenty-four subjects were assigned to each experimental condition. The scanning model adequately predicted final choice proportions for all conditions. A linear learning model in conjunction with the scanning model was applied to the sequential statistics with some success. (Author)

AD-430 682 Div. 28, 32
OTS price $5.60

American U., Washington, D. C.
PSYCHOLOGICAL OPERATIONS BIBLIOGRAPHY SUPPLEMENT NO. 1,
by Barbara Reason Butler and Gail Owens. Feb 64, 51p. Rept. no. RM64 3
Unclassified report

Descriptors: (*Psychology, Bibliographies), (*Bibliographies, Psychology), Abstracts, Operations, Propaganda, Foreign policy, Military strategy, Logistics, Military intelligence, Documentation, History, Warfare, United States Government, Culture, Military psychology, Communist, Communication systems.

AD-430 739 Div. 28
OTS price $3.60

RAND Corp., Santa Monica, Calif.
STUDIES IN INFORMATION PROCESSING THEORY: SIMILARITY AND FAMILIARITY IN VERBAL LEARNING,
by Herbert A. Simon and Edward A. Feigenbaum. Feb 64, 36p. Rept. no. RM3979PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Communication theory, Learning), (*Verbal behavior, Learning), (*Learning, Communication theory), (*Data processing systems, Theory), Models (Simulations), Experimental data, Coding.

This Memorandum presents results obtained by simulating various verbal learning experiments with the Elementary Perceiving and Memorizing Program (EPAM), an information processing theory of verbal learning. Predictions were generated for experiments manipulating intra-list similarity (Underwood); inter-list similarity (Bruce); and, familiarity and meaningfulness. The stimulus materials were nonsense syllables, learned in paired-associate fashion. A description of the EPAM-III model is given. The predictions made by the model are generally in good agreement with the experimental data. It is shown that the quantitative fit to the Underwood data can be improved considerably by introducing a process of ''aural recoding.'' The fit of the EPAM predictions to the Chenzoff data is particularly significant since it lends support to the hypothesis that the mechanism by means of which a high degree of meaningfulness of items facilitates learning is the high familiarity of these items. (Author)

AD-430 800 Div. 28
OTS price $1.60

Washington U., St. Louis, Mo.
THE PHENONENOLOGY OF AGREEMENT AND DISAGREEMENT IN DYADS,
by Richard H. Willis. Jan 64, 20p.
Contract Nonr81612
Unclassified report

Descriptors: (*Adjustment (Psychology), Social communication) (*Personality, Attitudes), (*Behavior, Personality), (*Social communication, Attitudes), Perception, Experimental data, Group dynamics, Adjustment (Psychology), Conditioned reflex.

A number of experiments with dyads and larger groups have been concerned with reactions to variations in level of consensus. The present experiment extends this line of investigation by focusing on shifts from initial agreement to subsequent disagreement, and from initial disagreement to subsequent agreement. By means of a simulated dyadic interaction procedure the behavior of partners, as perceived by Ss, was manipulated along two dimensions of response, viz., (a) probability of changing a binary response following initial agreement with S, and (b) probability of changing a binary response following initial disagreement with S. Perceptions by Ss of partners were determined by a post-experimental questionnaire. A double cluster pattern clearly emerged. The conformity and variability modes formed one cluster while the independence and anticonformity modes formed another. This patterning applied both to perceived closeness with which the partner attended to responses of S, and to perceived extent to which the partner accepted the responses of S. Means between clusters differed at a high level of significance. (Author)

AD-430 92, Div. 28
OTS price $11.50

Educational Testing Service, Princeton, N. J.
FUNCTIONAL LEARNING. THE LEARNING OF CONTINUOUS FUNCTIONAL MAPPINGS RELATING STIMULUS AND RESPONSE CONTINUA,
by J. Douglas Carroll. Sep 63, 156p. Rept. no. RB63 26
Contract Nonr1858 15, Grant G22889, Proj. NR150 088
Unclassified report

Doctorial thesis incooperation with Princeton U., N. J., Contract Nonr185815.

Descriptors: (*Learning, Reaction (Psychology)), (*Reaction (Psychology), Learning), Models (Simulation), Stimulation, Theory, Experimental data, Data, Analysis, Effectiveness, Group dynamics, Population, Performance tests.

A general model was proposed in which it was assumed that, in learning situations involving scaled stimuli and responses, subjects will tend to establish continuous functional relations between stimuli and responses. In particular, it was assumed that each subject has available a general functional form dependent only on certain parameters (p sub i) and that in learning the subject effectively assigns specific values to these parameters, thus establishing a specific function defining a unique mapping of stimuli into responses. (Author)

AD-431 092 Div. 28
OTS price $3.60

North Carolina State Coll., Raleigh.
S-R VS. R-S RECALL AND R-TERM VS. S-TERM RECALL FOLLOWING PAIRED-ASSOCIATE TRAINING,
by Slater E. Newman and Clifton W. Gray. Apr 63, 31p. Rept. no. TR6
Contract Nonr48608
Unclassified report

Descriptors: (*Learning, Theory), Training, Psychology, Stimulation, Performance tests, Students, Analysis.

The following predictions were tested in three experiments: (1) Following paired-associate training, the number of correct S-R pairs will exceed the number of correct R-S pairs and (2) the number of correct R-terms during R-term recall will exceed the number of correct S-terms during S-term recall. Each of these effects was predicted to be greater at low than at high levels of pronounceability (Predictions 3 and 4). The data supported Predictions 1 and 2 but not 3 and 4. (Author)

AD-431 093 Div. 28
OTS price $1.60

North Carolina State Coll., Raleigh.
EFFECTS OF TWO TECHNIQUES FOR IDENTIFYING DISCRIMINATIVE STIMULUS-TERM ELEMENTS ON PERFORMANCE DURING PAIRED-ASSOCIATE TRAINING,
by Slater E. Newman. June 63, 16p. Rept. no. TR7
Contract Nonr48608
Unclassified report

Descriptors: (*Learning, Theory), Stimulation, Performance tests, Reaction (Psychology), Psychology, Training.

In each of two experiments an Instruction Group was told that no two stimulus-term trigrams began with the same letter. For an Isolation Group the first letter of each trigram was typed in red on each pairing trial. The performance of both groups was compared with that of a Control Group

for which all trigram letters were black and which received no information about the structure of the trigrams, and with groups for which the stimulus terms were the first letters of the trigrams. The results were: (1) the instructions tended to foster responding to the first letter of each stimulus term - paired-associate learning was not facilitated; (2) isolating the first letter of each stimulus term on pairing trials did not appear to promote responding to the first letters, nor did it facilitate paired-associate learning; (3) the one-letter groups made more correct responses during training than the three-letter groups; and (4) Ss in all of the trigram groups reported most frequently responding to one letter from the trigrams, usually the first letter. (Author)

AD-431 094 Div. 28
OTS price $2.60

North Carolina State Coll., Raleigh.
ASYMMETRY IN R-TERM VS. S-TERM RECALL AS AN EXPLANATION FOR S-R VS. R-S ASYMMETRY,
by Slater E. Newman, Joseph W. Cunningham and Clifton W. Gray. Apr 63, 28p. Rept. no. TR5
Contract Nonr48608
Unclassified report

Descriptors: (*Learning, Theory), Training, Psychology, Tests, Reaction (Psychology), Analysis, Stimulation.

This experiment evaluated an explanation by Newman (1961) for the fact that following paired-associate training there are more correct responses on S-R than R-S tests. The effect of varying the number of training trials on S-term and R-term recall was also studied. Three predictions were tested: (1) the number of response terms recalled following paired-associate training will exceed by 1.6 the number of stimulus terms recalled; (2) the number of response terms recalled following 24 trials will exceed by 1.4 the number recalled following 8 trials; and (3) the number of stimulus terms recalled following 24 trials will exceed by 1.4 the number recalled following 8 trials. (Author)

AD-431 095 Div. 28
OTS price $1.60

North Carolina State Coll., Raleigh.
RESPONSE HIERARCHIES IN PAIRED-ASSOCIATE LEARNING,
by Slater E. Newman. 1963, 11p.
Contract Nonr48608
Unclassified report

Paper presented at Symposium on Theory and Method in Verbal Learning, at Southeastern Psychological Association, Miami Beach, Fla., 26 Apr 63.

Descriptors: (*Learning, Theory), Stimulation, Motivation, Training, Decision making, Analysis, Psychology.

AD-431 118 Div. 28
OTS price $1.60

Human Engineering Lab., Aberdeen Proving Ground, Md.
TARGET DETECTION AS A FUNCTION OF EXPOSURE TIME AND DISPLAY MODE,
by Lynn C. Oatman. Oct 63, 13p.
HEL TN8 63 Unclassified report

Descriptors: (*Operators (Personnel), Performance tests), (*Targets, Detection), (*Target discrimination, Television display systems), Time, Exposure meters, Tables, Human engineering.

This study was conducted to examine operator ability to detect targets on a closed-circuit television (TV) screen as a function of mode of presentation and exposure time. The results indicated significant differences between modes of presentation (TV vs. slide projection) and exposure times (0.3 second, one second, and five seconds), as well as a significant interaction between the mode of presentation and exposure time. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-429 423 Div. 29, 22, 30
OTS price $3.60

Bermite Powder Co., Saugus, Calif.
FEASIBILITY STUDY OF THE EXPLOSIVE LENS ANTI-FLASH SYSTEM FOR USE IN THE XM 112 PERISCOPE. Final rept.,
by R. K. Thomsen. Dec 63, 38p. Rept. no. 370
Contract DA04 495AMC1A
Unclassified report

Descriptors: (*Lenses, Periscopes), (*Periscopes, Armored vehicles), (*Eye, Radiation effects), Flashblindness, Nuclear explosions, Optical materials, Optical instruments, Detonations, Silicone plastics, Graphite, Colloids, Low-temperature research, Feasibility studies, Oscillographs.

A study program was conducted to determine the feasibility and practicality of adapting the Explosive Lens Flashblinder or ELF system for use in the Model XM 112 tank periscope. The purpose of the device is to protect the eyes of a viewer from the damaging effects of intense radiations caused by nuclear detonations. The ELF system, which employs an explosive to drive an opaquing material into a void between two lenses, was incorporated into experimental anti-flash shutters. A special test apparatus called an optical dynamic densitometer was used to measure the time required for the experimental units to reach various optical densities. As a result of the tests a basic shutter design was selected which utilized a cloud by-pass, detonator-driven system. At ambient condition, using colloidal graphite in Arneel, closure times as low as 75 microseconds at the desired optical density were obtained. However, the Arneel mixture become a solid below -20 F. The opaquing material Silicone 555, was fired at -40 F and successfully closed the aperture in 135 microseconds. (Author)

AD-429 887 Div. 29, 30
OTS price $10.50

Dunlap and Associates, Inc., Darien, Conn.
DEVELOPMENT OF A METHODOLOGY FOR MEASURING EFFECTS OF PERSONAL CLOTHING AND EQUIPMENT ON COMBAT EFFECTIVENESS OF THE INDIVIDUAL FIELD SOLDIER,
by Alin Gruber, Jack William Dunlap and George DeNittis. Feb 64, 119p.
Contract DA19 129qm2068, USATECOM Proj. 8 3 7700 01E
Unclassified report

Descriptors: (*Protective clothing, Military requirements), Acceptability, Performance tests, Test methods, Effectiveness, Army research, Statistical analysis, Military personnel, Armed forces operations, Reliability, Measurement, Performance tests.

Recent developments in conventional and exotic weapon systems are creating urgent needs for new types of protective clothing and devices. While this protection may enable the soldier to survive in an otherwise fatal environment, it imposes certain physical, physiological, and psychological stresses and limitations such that his ability to protect himself against other weapons, to move, or to take aggressive action may be severely limited. The ultimate goal of the project is a field measurement system that will provide objective data regarding the effects of personal clothing and protective equipment on the combat effectiveness of the individual infantry soldier. (Author)

AD-431 163 Div. 29
OTS price $1.25

General American Transportation Corp., Niles, Ill.
METHOD OF HEATING FOODS DURING AEROSPACE FLIGHT,
by R P Nuccio and S. J Lis. Dec 63, 35p.
Rept. no. MR1187 60
Contract AF33 657 7922, Proj. 6373, Task 637305
AMRL TDR63 135 Unclassified report

Descriptors: (*Food, Heating), (*Space flight, Food), Containers, Space flight, Test methods, Models (Simulation), Weight, Feasibility studies.

A feasibility study of methods for heating foods during aerospace flight has shown that electrical resistance heating is the most effective technique. An internal heating probe is more efficient than external heating, but special food containers are required. A full-scale engineering model of an external heating food warmer, capable of heating available food containers, was designed, fabricated, and evaluated. This model has three separately controlled stations for mounting flexible heaters that are wrapped around the container to be heated. The system occupies a volume less than 288 cubic inches and weighs less than 4 pounds, when provided with six heater assemblies. Laboratory tests verified that the system meets the requirements specified, and it can heat a 6-ounce can of ham and eggs from 75 F to 160 F with less than 14 watt-hours of energy. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-429 351 Div. 30, 15, 16
OTS price $1.60

RAND Corp., Santa Monica, Calif.
CHALLENGES OF MODERN CONTROL THEORY,
by Richard Bellman. Jan 64, 7p. Rept. no. RM3956PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Control systems, Mathematical models), Theory, Numerical analysis, Biology, Medicine, Computers, Teaching machines, Algebra, Algebraic topology, Cybernetics, Nervous system, Brain, Prosthetics, Deafness, Blindness, Cancer, Heart, Mental disorders.

The fundamental objective of the new scientific discipline called 'control theory' is that of modifying the behavior of a system subject to various constraints of feasibility so as to achieve desired aims. From the mathematical point of view, the prime purpose is to approximate to reality by means of hierarchies of mathematical models, each representing a projection of the scientific scene. Some aspects of this attitude are discussed and the possible contributions of modern control theory to the biomedical domain are briefly indicated. (Author)

AD-429 388 Div. 30
OTS price $6.60

Naval Postgraduate School, Monterey, Calif.
FEEDBACK CONTROL SYSTEMS. DESIGN WITH REGARD TO SENSITIVITY,
by Bui Tien Rung and George J. Thaler. Jan 64, 59p.
NPS RR41 Unclassified report

Descriptors: (*Control systems, Feedback), Programming (Computers), Computers, Vector analysis, Networks, Calculus of variations, Design.

A definition is given for 'root sensitivity,' relating the changes in plant's parameters to corresponding changes in the system's roots. Interesting properties of root-sensitivity are shown, then applied to the derivation of a laborless graphical method for obtaining the sensitivity of a given root. Finally, a compensation design method is proposed, which not only secures a desired location for the system's dominant roots on the s-plane, but also simultaneously satisfied conditions concerning the sensitivity of these dominant roots to the varying plant parameter(s). Examples are solved using the proposed method, and the results verified with the analog computer. (Author)

AD-429 415 Div. 30
OTS price $2.60

Naval Postgraduate School, Monterey, Calif.
THE SYNTHESIS OF OPTIMUM AND QUASI-OPTIMUM MINIMUM TIME CONTROLS FOR SECOND ORDER SYSTEMS,
by Harold Titus and James Demetry. Sep 63, 1v.
NPS RP38 Unclassified report

Descriptors: (*Control systems, Optimization), Nonlinear systems, Computers, Programming (Computers), Mathematical analysis, Errors, Differential equations, Time.

The digital and analog synthesis of several optimum and quasi-optimum minimum-time controls for systems with real, null, and complex eigenvalues is discussed. Controls are designed using nonlinear feedback. Examples demonstrate the simplicity of the design. An example of the control of a nonlinear system is given using a technique which is effectively a linearization of the system about each state point on a trajectory. A quasi-optimum minimum-time control is generated by substituting the nonlinear functions of the states for their respective linearized characteristics. (Author)

AD-429 416 Div. 30
OTS price $3.60

Coordinated Science Lab., U. of Illinois, Urbana.
OPTIMAL MATCHING OF LINEAR NETWORKS,
by R. A. Rohrer. Dec 63, 29p. Rept. no. R187
Contract DA36 039AMC02208E, Proj. 3A99 25 004
Unclassified report

Descriptors: (*Linear systems, Optimization), (*Calculus of variations, Energy), Negative resistance circuits, Networks, Topology, Integral equations, Feedback amplifiers, Parametric amplifiers.

Given the time domain specification for any (or any two) of the networks--the source network, the matching network, and the load network--specify the remaining network(S) so that the maximum total energy is transferred from the source to the load for arbitrary source voltages. This problem can be solved (i.e., the matching network can be specified, its realizability being an open question) in general by means of the classical calculus of variations, which yields time domain specifications for the unknown network and simple conditions which show the limitations on the applicability of the results. The further question of when the specified matching networks can actually be realized (or to what extent they can be approximated) is included. (Author)

AD-429 417 Div. 30
OTS price $4.60

Naval Postgraduate School, Monterey, Calif.
DISCONTINUOUS SYSTEM VARIABLES IN THE OPTIMUM CONTROL OF SECOND ORDER OSCILLATORY SYSTEMS WITH ZEROS,
by William B. Nevius and Harold Titus. June 63, 27p.
NPS RP37 Unclassified report

Descriptors: (*Control systems, Optimization), Linear systems, Numerical analysis, Computers, Differential equations, Switching circuits, Transformations (Mathematics), Computer logic.

Given a second order oscillatory system with one zero, find the optimum control for zeroing the errors with minimum fuel. A system is found that reacts identically to the system with zeros except at the points of discontinuity. Control of this parallel system can be stated in terms of the state space variables. This logic can then be used to switch the original plant. The method of Pontryagin is used to solve the problem. A brief description of this method is presented. (Author)

AD-429 430 Div. 30, 12
OTS price $2.60

System Development Corp., Santa Monica, Calif.
OPERATIONAL SPACE TRACK SYSTEM AT COLORADO SPRINGS. PROGRAM SYSTEM,
by J. R. Stanfield. 10 Jan 64, 24p. Rept. no. TM LX89 002 00
Contract AF19 628 1648
ESD TDR63 639 vol. 3 Unclassified report

Descriptors: (*Data processing systems, Programming (Computers)), (*Satellites (Artificial), Tracking).

The purpose of this memorandum is to provide a general description of the programs currently in the Space Track B-2 System. (Author)

AD-429 514 Div. 30, 2
OTS price $3.60

New Mexico U., Albuquerque.
OZONE MEASURING DEVICES.
Final rept., 27 Jan 60-31 Oct 62,
by Victor H. Regener. 10 Dec 63, 1v.
Contract AF19 604 7211
AFCRL 64 212 Unclassified report

Descriptors: (*Ozone, Measuring devices (Electrical and electronic)), (*Measuring devices (Electrical and electronic), Ozone), Chemicals, Luminescence, Balloon equipment, Radiosondes, Diffusion, Instrumentation, Atmosphere, Calibration.

In this Final Report a description is furnished of the essential technical details of the chemiluminescent ozone balloon sonde and of its adaptation to ozone recordings from pressurized aircraft. A description of the ozone generator/calibrator and of the chemiluminescent surface recorder is also included. (Author)

AD-429 521 Div. 30, 15
OTS price $9.60

Space Technology Labs., Inc., Redondo Beach, Calif.
ASSOCIATIVE MEMORY ALGORITHMS AND THEIR CRYOGENIC IMPLEMENTATION,
by J. L. Rogers and A. Wolinsky. Dec 63, 113p.
Rept. no. 8670 6007RU000
Contract Nonr3839 00
Unclassified report

Descriptors: (*Computer storage devices, Design), (*Programming (Computers), Programming language), Cryogenics, Computers, Computer logic, Data storage systems, Control systems.

The report has two aspects. One is the design of a versatile cryogenic associative memory; the other is the analytical survey of existing algorithms for associative memories, the description of certain new algorithms, and the discussion of the implementation of these algorithms in the associative memory of this report. The cryogenic associative memory described herein gains its versatility from the presence of a small number of tag bits of special design in each word. These tag bits may be used for the marking of words which satisfy certain criteria; thus, they serve to store intermediate and final results of various operations in the words concerned. In the discussion of associative memory algorithms, the basic features of these algorithms are analyzed. From this analysis, new variations of algorithms are developed in several instances which are in various ways superior to the existing ones. The implementation of the algorithms in the general-purpose associative memory of this report is also discussed and a number of new applications of associative memory techniques are described. (Author)

AD-429 534 Div. 30, 8
OTS price $2.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
MULTICHANNEL REAL-TIME TELEMETRY DATA REDUCTION SYSTEM,
by John K. Baird and Jacky D. Cates. Dec 63, 17p.
DA Proj. 1A2 50206D241
AERDA 96 Unclassified report

Descriptors: (*Telemetering transmitters, Guided missile ranges), (*Telemetering receivers, Guided missile ranges), Data processing systems, Calibration, Transducers, Telemetering data, Analog systems, Digital systems, Signals, Theory, Printed circuits, Analysis.

The Real-Time Telemetry System, RTS, increases the capability of White Sands Missile Range (WSMR) telemetry data processing facilities by performing automatic linearization and scale-factoring in real-time. A preflight calibrator designed for use with the system, connects to the missile telemetry system and automatically calibrates the telemetry data transmission link from the transducer output to the RTS output. The system has the capability to reduce eight channels of telemetry data and provides both analog and digital output. (Author)

AD-429 545 Div. 30, 3, 7
OTS price $1.10

Southern Research Inst., Birmingham, Ala.
DESIGN STUDY TO DEVELOP INSTRUMENTATION FOR FIELD EVALUATION OF CHEMICAL AGENTS.
Monthly progress rept., Jan 64,
by Alvin N. Bird, Jr. 17 Jan 64, 5p.
Contract DA18 108AMC32A
Unclassified report

Descriptors: (*Electrolytic cells, Test methods), (*Samplers, Design), (*Counting methods, Instrumentation), Video signals, Circuits, Particle size, Cameras, Aerosols, Electrodes, Platinum, Silver, Nitrogen, Nitrogen compounds, Oximes.

Measurements were made to obtain information concerning the operation of the cell when some of the variables were changed, specifically, variables which affect the cell response time and output. The platinized Pt electrode was replaced by various materials in an effort to decrease the cell response time. The only other electrode offering any promise was Ag. A new electrochemical cell should be ready for evaluation during January. This cell was designed with replaceable parts so that variables such as oxime flow, electrode spacing, and electrode materials could be changed easily. Aerosol Flash Camera: A circuit was added to widen the video pulse produced by the very small particles. The height, or amplitude, of the pulse is unchanged so the number of TV lines intercepted still gives an accurate indication of the particle size. By this method particles that intercept as little as one TV line can be counted. The ability to count one TV line should make it possible to count 5-micron particles with 20% error with only 4X magnification. (Author)

AD-429 723 Div. 30
OTS price $8.10

Hudson Labs., Columbia U., Dobbs Ferry, N. Y.
COMPUTER PROGRAM REFERENCE MANUAL OF THE HUDSON LABORATORIES COMPUTING FACILITY. VOLUME I. BASIC UTILITY PROGRAMS,
ed. by Melvin Klerer. May 63, 1v. Rept. no. TR105
Contract Nonr266 84
Unclassified report

Descriptors: (*Instruction manuals, Computers), (*Computers, Instruction manuals), Magnetic tape, Computer storage devices, Information retrieval, Input-output devices.

Write-ups are given for the following programs: Square Root, Sine, Cosine, Log sub e, Log sub ten, Log sub two, Arctangent, Arcsine, Arcosine, Exponential, Decimal to Binary, Free Field Input, Binary to Decimal, Decimal Output, TYPE, Blank, TRACE, PRINT OCTAL, Set Memory, Zero Memory, Minus One Memory, Blank Memory, Key Punch to GECOM Character Change, Plot, Multiplot, TAPE-WIZ with COMPILE and GO, Magnetic Tape Performance Test, Tape Dump, Program Interrupt by Computer Dump to Tape and Retrieve Routine, WIZ TAPE Subroutine, Power Spectrum, Autocorrelation and Power Spectrum II. These programs have been coded for a GE-225 Computer. (Author)

AD-429 788 Div. 30, 10
OTS price $3.60

United Research, Inc., Cambridge, Mass.
AVIATION FUEL CONTAMINATION INDICATOR.
Final engineering rept.
5 Jan 61, 32p.
Contract NOas59 6121f
Unclassified report

Descriptors: (*Aviation fuels, Monitors), (*Contamination, Monitors), (*Monitors, Aviation fuels), Aircraft carriers, Water, Particles, Iron compounds, Aluminum compounds, Oxides, Fuel filters, Dielectric properties, Circuits, Capacitors, Meters, Instrumentation, Design.

Navy aircraft carrier fuel systems are subject to occasional excess levels of fuel contamination. Thus a need has existed for a continuous monitor of fuel cleanliness. An on-line fuel contamination indicator which responds continuously to suspended water and to solid particulate matter present in a fuel line to which it is attached has been developed. The operating principle of the indicator is based on the fact that contaminants have dielectric constants different from that of the fuel and are particulate in form. A prototype indicator abstracts 14 gal per minute of fuel from the fuel line pumps this fuel sample through the sensing section and thence back into the fuel line. Resolution of better than 1 mg of a calibration contaminant (specified by the Navy) per liter of fuel is shown by this prototype. Contaminant levels up to 100 mg per liter are indicated. Response to suspended water is several times greater than that to the calibration contaminant. Response is indicated on a d-c meter. (Author)

AD-429 797 Div. 30
OTS price $31.00

California Research Corp., La Habra.
REFLECTION AND TRANSMISSION OF PLANE COMPRESSIONAL WAVES,
by R. D. Tooley, T. W. Spencer and H. F. Sagoci.
19 Dec 63, 1v. Rept. no. SR4
Contract AF19 604 8344, Proj. 8652, Task 865206
AFCRL 64 205 Unclassified report

Descriptors: (*Wave transmission, Boundary value problems), Reflections, Velocity, Differential equations, Data.

The energy partition of a plane compressional (P) wave impinging upon a plane interface is analyzed. The mathematical solution is presented and discussed with particular emphasis on the nature of the transmitted waves when the angle of incidence exceeds the critical angle. Extensive tables of data are presented which cover a wide range of the input parameters. The data is discussed and representative data samples plotted. (Author)

AD-429 847 Div. 30, 15
OTS price $2.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
OPTIMAL CONTROL OF LINEAR PLANTS WITH RANDOM PARAMETERS,
by R. F. Drenick and L. Shaw. 15 Nov 63, 24p.
Rept. no. 1200 63
Contract DA ARO D31 124G144
Unclassified report

Descriptors: (*Control systems, Optimization), Linear systems, Probability, Mathematical models, Statistical analysis, Stochastic processes, Time.

The subject of this paper is the optimal control of linear plants whose coefficients and whose reference signals are random processes. The discrete-time as well as the continuous-time problems are treated and some fairly deep-seated distinctions between the two are pointed out. Special emphasis is placed on control over long periods of time. A set of assumptions is laid down under which the transition to infinitely long periods of operation is tractable. It is shown that a discrete-time plant in controllable, in the sense that the rate of the mean-squared error remains finite, only when certain necessary and sufficient conditions are fulfilled by the statistics of the plant parameters. There is no similar constraint for controllability of analogous continuous time plants. (Author)

AD-429 897 Div. 30
OTS price $1.10

RAND Corp., Santa Monica, Calif.
ON THE EXPLOSION OF AUTOMATION,
by Richard Bellman. Feb 64, 5p. Rept. no. P2865
Unclassified report

Descriptors: (*Human engineering, Automation), (*Automation, Public opinion), (*Computers, Social science), Decision making, Design, Digital computers.

AD-429 924 Div. 30, 8
OTS price $7.60

Army Frankford Arsenal, Philadelphia, Pa.
DESIGN STUDY OF SELF-CALIBRATING ELECTRICAL MEASUREMENT SYSTEM,
by M. Mondress, R. S. Zelenka and A. Hoffman.
Dec 63, 73p.
DA Proj. 1A013001A039
AFA MR M64 19 1 Unclassified report

Descriptors: (*Measuring devices (Electrical & electronic), Feasibility studies), (*Test sets, Electronic equipment), Electric potential, Resistance (Electrical), Time, Reliability (Electronics), Computers, Automatic, Frequency, Electric currents, Electrical properties, Capacitance, Phase measurement.

A fully automated self-calibrating electrical measurement test set for field use is proposed. The key features of the system are: (1) a set of converters for reducing all measurements to quantities involving the basic three parameters (voltage, resistance and time); (2) direct electrical measurement capability, reducing the number of measurement devices in the field; (3) computational capability for the solution of measurement network equations and the performance of error analysis; (4) full automatic execution of stored program calibration procedures and measurement routines; (5) self-check

philosophy to insure fidelity of the system at all times; (6) minimal standards package consisting of single standards of resistance, voltage and time. The standards package is replaceable on a periodic basis. The system is described on a technical basis after which a proposal for the fabrication of a prototype model is presented. (Author)

AD-429 935 Div. 30
OTS price $9.10

Syracuse U. Research Inst., N. Y.
THEORY OF ADAPTIVE MECHANISMS.
Final rept.,
by M. K. Hu, E. Kletsky, S. Goldman, E. Stabler and M. Krieger. Dec 63, 110p. Rept. no. EE894 6307F
Contract AF30 602 2543, Proj. 5581, Task 558104
RADC TDR63 334 Unclassified report

Descriptors: (*Pattern recognition, Vision), (*Artificial intelligence, Teaching machines), (*Pattern recognition, Theory), (*Teaching machines, Computer logic), Control systems, Communication systems, Time, Data processing systems, Adaptive control systems, Medicine, Diagnosis, Mathematics, Blood.

This project is composed of four different but related tasks. These are (1) Information Contents of Time Continuous Processes. (2) Visual Pattern Recognition by Moment Invariants. (3) Control and Communication Systems in the Blood. (4) Experiments on the Use of Threshold Logic for Learning Machines. All four are summarized in Part I. A theoretical systematic study of pattern recognition by moment invariants is presented in Part II, and the associated experimental studies are given in Part III. Finally, a brief description of Threshold Logic is appended in Part IV. (Author)

AD-429 957 Div. 30, 12, 8, 5, 6
OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIVISION 7. ENGINEERING.
Quarterly progress rept., 1 Sep-30 Nov 63.
15 Dec 63, 26p.
Contract AF19 628 500
ESD TDR63 594 Unclassified report

Descriptors: (*Air Force research, Engineering), Research program administration, Cryogenic storage devices, High-pressure research, High-temperature research, Non-destructive testing, L band, Microwave equipment, Antennas, Structural shells, Television cameras, Guided missile tracking systems, Atmosphere entry, Reentry vehicles, Payload, Airborne, Instrumentation, Jet transport planes, Spectrum analyzers, Space communication systems, Communication satellites (Active), Radar transmitters, Control systems, Radomes.

The mechanical Engineering Group participates in the General Research program be evaluating closed cycle cryogenic refrigerators, by designing vacuum metallizing equipment, and by refining the high pressure apparatus used in materials research. In addition, the art of stress analyzing large and complicated structures such as precise antennas has been advanced by a considerable effort in shell analysis and the development of computer programs for both static and dynamic analyses. The optical instrumentation of the KC-135 aircraft for the PRESS program has progressed to its third and final phase. In the Space Communications program, two interesting projects are developing in the design of an air-transportable compact communications terminal, and in the design of a communications research satellite. The major new effort of the Construction Engineering Group during the quarter has been the design and initial construction of a radar transmitter research facility for the Radar Division. (Author)

AD-429 984 Div. 30, 23
OTS price $1.10

RAND Corp., Santa Monica, Calif.
BIGGER COMPUTERS AND BETTER MATHEMATICIANS,
by Richard Bellman. Feb 64, 6p. Rept. no. P2863
Unclassified report

Descriptors: (*Computers, Scientific personnel), (*Mathematics, Scientific personnel), Digital computers, Design, Theory, Artificial intelligence.

AD-430 022 Div. 30
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PARACHUTE JUMPING COUNTER,
by I. Bondarenko and V. Chekunov. 6 Jan 64, 10p.
FTD TT63 1120 Unclassified report

Trans. from Krylya Rodiny, no. 1, pp. 20-22, 1957.

Descriptors: (*Parachute jumping, Descent trajectories), Parachute descents, Measuring devices (Electrical & electronic), Meteorological parameters, Instrumentation.

AD-430 094 Div. 30, 15, 8
OTS price $2.60

Cruft Lab., Harvard U., Cambridge, Mass.
FINITE-TIME SELF-OPTIMIZING SYSTEMS,
by K. S. Narendra and L. E. McBride, Jr.
13 Nov 63, 27p. Technical rept. no. 422
Contract Nonr1866 16, Proj. NR372 012
Unclassified report

Descriptors: (*Optimization, Linear systems), (*Linear programming, Analysis), Mathematical models, Simultaneous equations, Functions, Integration, Errors, Stability, Correlation techniques, Time.

A correlation method proposed earlier for the optimization of linear systems by altering parameters to reduce a mean-square error criterion is extended to the cases of transient operation, non-quadratic criteria and time varying systems. Stability analysis indicates that the open-loop self-optimizing system is stable regardless of the speed with which the parameters are altered. When parameters of a closed-loop system are permitted to vary rapidly with time, it is found that the problem becomes analogous to that of optimal terminal control, and its solution is a generalization of the methods of optimal programming. (Author)

AD-430 136 Div. 30
OTS price $16.50

RAND Corp., Santa Monica, Calif.
DATA SYSTEM DESIGN AND CONTROL USING AUTOSATE --

AN AUTOMATED DATA SYSTEM ANALYSIS TECHNIQUE,
by D. D. Butler, E. M. Fairbrother and O. T. Gatto. Feb 64, 252p. Rept. no. RM3976PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Data processing systems, Analysis), Design, Test methods, Control, Automation. Data storage systems.

This memorandum describes an automated data system analysis technique (AUTOSATE) designed to alleviate some of the aforementioned problems. It is a technique executed in three phases, which are described in detail in Section II: (1) documenting system data flows, (2) translating the analysis inputs into machine readable form, and (3) preparing a series of analysis reports by computer. The documentation of system data flows includes station interviews and system specification phases during which special data-gathering forms are generated to identify data activity at interview points called stations. Stations are the nodes in a data system network at which data activity is identified with the events that created the data. Translating inputs into machine-readable form, the second phase of AUTOSATE, includes a manual edit and control phase, along with keypunching and card-to-tape operations of the data generated from the documenting phase. Preparing a series of reports by computer occurs in the third phase of the technique (where the data gathered are examined and evaluated), by analyzing station data relationships, characteristics, and storage requirements. (Author)

AD-430 142 Div. 30, 26
OTS price $4.60

Documentation Inc., Bethesda, Md.
MANAGEMENT CONTROL DATA SYSTEM OF THE U.S. AIR FORCE OFFICE OF SCIENTIFIC RESEARCH.
Final technical rept.
Nov 63, 48p.
Contract AF49 638 1212
AFOSR 64 0109 Unclassified report

Descriptors: (*Management engineering, Data processing systems), (*Data processing systems, Management engineering), Information retrieval, Data storage system, Procurement, Personnel management, Control.

MCDS is a centralized, automated total system designed to fulfill the information requirements of the U. S. Air Force Office of Scientific Research in the management of basic research. The scope of the system covers: (1) control of all proposal data from the time of receipt until a specific action completes the proposal phase; (2) the procurement cycle which is initiated upon the acceptance of a proposal; (3) the storage of all obligated purchase actions in a Historical file from beginning to completion of a research effort; and (4) a completed file which is a repository for all completed research investigations which are not a function of the active program. The purpose of this research was to analyze the needs of AFOSR's management personnel and to develop a comprehensive system which would furnish the output requirements of AFOSR management. (Author)

AD-430 194 Div. 30, 25
OTS price $1.10

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
AN ANALYSIS OF SPEECH SPECTRA IN TERMS OF A MODEL OF ARTICULATION,
by J. M. Heinz. Sep 63, 6p. Rept. no. SR15
Contract AF19 604 6102, Proj. 4610, Task 461002
AFCRL 63 557 Unclassified report

Descriptors: (*Speech, Analysis), (*Speech, Models (Simulations)), (*Speech transmission, Digital computers), (*Acoustics, Symposia), Production, Input-output devices, Physiology, Acoustic properties, Computers, Computer logic, Voice communication systems, Theory, Spectrum analyzers, Frequency.

Research is possible with these programs to compare an internally generated spectrum with an actual speech spectrum and to vary manually the input parameters until an optimum match is obtained. The results of the match are parameters which relate to the physical dimensions of the vocal tract and thus make it possible to study the dynamics of the articulatory system through analyses of the acoustic signal. Currently, data are being collected by this procedure, particularly in the vicinity of vowel-consonant boundaries. The program will prove useful also for investigating other possible models for generating vocal-tract area functions from the specification of a small number of parameters. (Author)

AD-430 198 Div. 30, 15
OTS price $5.60

Parke Mathematical Labs., Inc., Carlisle, Mass.
ON ERROR-CORRECTING, VARIABLE-LENGTH CODES,
by L. Calabi. Dec 63, 57p. Rept. no. SR9
Contract AF19 604 7493, Proj. 5628
AFCRL 64 9 Unclassified report

Descriptors: (*Programming (Computers), Errors), Communication theory, Programming languages, Bibliographies, Inequalities, Sequences, Numerical analysis.

Binary, variable length codes are introduced which are capable of detecting and correcting transmission errors. The study of prefix codes, and of block codes with distance of at least 1, may be looked at as special cases of the theory started in this report. (Author)

AD-430 221 Div. 30
OTS price $3.60

David Taylor Model Basin, Washington, D. C.
DIGITAL PRESSURE RECORDING SYSTEM FOR THE LOW-TURBULENCE WIND TUNNEL,
by F. E. Frillman and W. R. Schwarting.
July 61, 30p.
DTMB 1561 Unclassified report

Descriptors: (*Digital recording systems, Wind tunnel models), (*Wind tunnels, Digital recording systems), Instrumentation, Pressure, Transducers, Automatic, Display systems, Distribution, Measurement.

This instrumentation system is intended mainly for measuring air pressure distribution on models tested in David Taylor Model Basin low-turbulence wind tunnel. The system automatically scans, digitizes, and records up to 21 air pressure inputs at the rate of one pressure reading per second. The report describes th salient features of the instrumentation, gives procedures for connecting, operating, and calibrating, and summarizes the results of an evaluation of the system. (Author)

AD-430 244 Div. 30, 15
OTS price $1.60

Maryland U., College Park.
CODING AND USE OF INFORMATION IN PROBLEM SOLVING.
Final rept., Sep 58-Aug 63,
by Murray Glanzer. 10 Feb 64, 15p.
Contract DA49 007md1004
Unclassified report

Descriptors: (*Data processing systems, Programming (Computers)), Data storage systems, Communication theory, Perception, Memory, Numbers, Teaching machines, Artificial intelligence, Programming languages, Machine translation.

Work completed in an investigation of information-processing aspects of problem solving and of other forms of complex performance is described. These aspects included the encoding, processing, and storage of information. Work is described on the areas of problem solving, encoding of perceptual information, and learning and storage of verbal materials. (Author)

AD-430 260 Div. 30, 28
OTS price $1.60

System Development Corp., Santa Monica, Calif.
COMPUTER ANALYSIS OF TEXT FOR THE MEASUREMENT OF SOCIAL PERCEPTION DURING HUMAN RELATIONS TRAINING,
by J. D. Ford, Jr. 9 Jan 64, 11p. Rept. no. SP1373 001 00
Unclassified report

Descriptors: (*Public relations, Training), (*Sociometrics, Computers), (*Applied psychology, Training), (*Behavior, Computers), Social communication, Analysis, Learning, Perception.

This report describes a preliminary study where automated content analysis was applied to the assessment of changes in social perception during sensitivity training. It describes the particular type of training studied, and its procedures and goals; the computer techniques by which automated content analysis was accomplished; the type of data used to infer social perception; and the results of the content analysis. (Author)

AD-430 262 Div. 30
OTS price $1.10

System Development Corp., Santa Monica, Calif.
PHILCO 2000 JOVIAL SUBROUTINE LIBRARY,
by Ellen Clark. 19 Apr 62, 2p. Rept. no. TM555 202 00
Unclassified report

Descriptors: (*Programming (Computers), Machine translation), (*Machine translation, Programming language), Operation.

This report states that the Philco 2000 JOVIAL compiler now has the facility to call machine language subroutines in from a library. It also reports that at present only three such subroutines are available, BTOD, DTOB, and REMQUO. (Author)

AD-430 264 Div. 30
OTS price $2.60

System Development Corp., Santa Monica, Calif.
GROUP COMMUNICATIONS AND PROGRAM INTERACTION IN TIME-SHARING SYSTEMS,
by Arthur M. Rosenberg. 14 Oct 63, 29p. Rept. no. SP1386
Unclassified report

Descriptors: (*Computers, Man), Feedback, Intercommunication systems.

Communications between a human and a computer are of great significance to on-line operations afforded by time-sharing systems. However, the facility for direct and indirect communications between individual users and time-sharing systems object programs will expand the range of useful applications of such systems. This paper describes a number of applications being investigated in the ARPA-SDC time-sharing system that involve variations on group communication with a computer system and indicates operational design considerations necessary to implement such general communication capabilities in a time-sharing system. (Author)

AD-430 295 Div. 30
OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
DOUBLE SHOCK TUBE METHOD FOR SIMULTANEOUS DETERMINATION OF HIGH PRESSURE AND TEMPERATURE OF AN ENCLOSED GAS,
by W. R. Grabowsky, L. Y. Lam and D. A. Durran. 20 Jan 64, 19p. Rept. no. TDR269 4230 10 6
Contract AF04 695 269
SSD TDR63 368 Unclassified report

Descriptors: (*Wind tunnels, Gases), (*Shock tubes, Gases), Pressure, Temperature, Electric discharges, Optical equipment, Measurement, Hypersonic wind tunnels, Theory, High-pressure research, Instrumentation.

A method is discussed for the simultaneous determination of pressure and temperature of a confined, impulsively heated gas. The method requires the measurement of the shock Mach numbers in two small shock tubes that use the impulsively heated gas as a driver. Different initial pressures in the shock tubes result in two simultaneous equations for driver pressure and temperature as a function of the measured shock Mach numbers. These equations are examined for ideal and real gases in the limit of infinite driver to driven section area ratio. The effect of contamination of the driver gas during the heating pulse is considered also. (Author)

AD-430 327 Div. 30, 14
OTS price $1.60

General Dynamics, Fort Worth, Tex.
ADHESIVE TORSIONAL SHEAR TEST,
by L. R. Lunsford. 1 Feb 62, 18p. Rept. no. ERR FW134
Contract AF33 657 11214
Unclassified report

Descriptors: (*Adhesives, Shear stresses), (*Shear stresses, Bonded joints), (*Test methods, Shear stresses), Torsion meters, Test equipment, Jigs, Nitrile rubber, Aging (Materials), Strain (Mechanics), Loading (Mechanics).

In order to approach idealizedconditions a torsional shear load is applied to the adhesive or braze through a circular specimen which produces a peripherally uniform shear stress with linear radial variations. The maximum shear strength of the adhesive. By measuring the adhesive strain as a function of load, stress-strain curves are obtained. The shear modulus of elasticity can be calculated from the stress-strain curve (adhesive must approach the requirements of a Hookian solid). Stress-strain curves have been obtained for three different types of adhesives. Reproducible results were obtained from the adhesive torsional shear apparatus using several sets of specimens bonded with the same adhesive. (Author)

AD-430 441 Div. 30, 15, 9
OTS price $22.25

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
STABILITY IN NONLINEAR CONTROL SYSTEMS. (Ustoychivost' Nelineynykh Reguliruyemykh Sistem),
by A. M. Letov. 24 Oct 63, 424p.
FTD TT63 399 Unclassified report

Translated from Russian.

Descriptors: (*Control systems, Stability), (*Nonlinear systems, Control), (*Nonlinear systems, Stability), (*Control systems, Reviews), Equations, Motion, Programming (Computors), Computers, Mathematical analysis, Optimization, Special purpose computers, Aircraft, Flight paths, Numerical analysis, Perturbation theory, Functions.

The results of certain investigations of stability and the degree of stability of nonlinear control systems with one or two regulators are reported. The problems considered concern what is called absolute stability, i.e., stability under unbounded perturbations, with regulators of arbitrary nonlinear characteristics defined precisely only to the extent of their belonging to a certain class of functions. A general study, first begun by A.I. Lur'ye, is developed, generalized, and extended to cover a whole series of broader and more complicated classes of control systems, and various methods are set forth for solving problems in the absolute stability of control systems. (Author)

AD-430 464 Div. 30, 5, 8
OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
FUNDAMENTAL ACCURACY LIMITATIONS FOR PILOT-TONE TIME-BASE CORRECTION,
by Jean A. Develet, Jr. 10 Feb 64, 14p.
Rept. no. TDR269 9990 3
Contract AF04 695 269
SSD TDR64 9 Unclassified report

Descriptors: (*Time signals, Errors), (*Data transmission systems, Time signals), Timing circuits, Signal-to-noise ratio, Integral equation, Time lag theory, Feedback.

Wiener filtering concepts are applied to the problem of determining the accuracy limitations for a pilot-tone time-base correction system. In this system, the correction is accomplished by the addition of a stable sinusoid in a clear area of the signal baseband. After transmission through a medium with varying time delay and additive noise, the pilot tone is recovered by a tracking filter, The output of the tracking filter can be used to estimate the variations intime delay of the transmission medium. A statistical optimization is then performed to find the minimum residual time-base error in the desired signal after correction by such a system. The theory of parameter estimation indicates that the system described is near optimum and represents a lower bound on achievable accuracy. The results for the special case of white band-limited time-delay variations are presented in the form of curves. (Author)

AD-430 573 Div. 30
OTS price $1.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
PRECISE MEASUREMENT OF ATMOSPHERIC TEMPERATURES,
by Albert R. Tebo. Dec 63, 13p.
Task 1A011001B021 11
AELRDL 2405 Unclassified report

Descriptors: (*Atmosphere, Temperature), (*Temperature, Measurement), Linear systems, Instrumentation, Thermistors, Detectors, Electric bridges, Resistors, Electric potential, Electric current, Potentiometers, Recording systems.

A simple method has been devised for the continuous measurement of atmospheric temperature on a linear scale, with an instrumental accuracy of ±0.06 C over the temperature range -40 C to + 40 C. A bead thermistor is used as the sensor in an off-balance Wheatstone bridge. Eight 10-degree spans are covered by switching different fixed resistors into the balance arm of the bridge. Full-scale output for a 10-degree span can be adjusted to 10 millivolts with a low-voltage d.c. source (6 volts), and this output can be conveniently fed into a null-balance-type potentiometric recorder. Switching from one span to another is accomplished automatically by microswitches on the pen stops of the recorder at both ends of the scale. With an identifying printer or marker pen controlled by these switches, the temperature-measuring system can be made completely automatic. (Author)

AD-430 598 Div. 30, 32
OTS price $6.60

Office of Aerospace Research, Washington, D. C.
THREAT OF COMMUNIST TECHNOLOGY: PROPOSALS FOR FREE WORLD COOPERATION IN R&D AND INFORMATION TRANSFER,
by Hyman H. Album and Alexander G. Hoshovsky.
1 Sep 63, 63p.
OAR 18 Unclassified report

Descriptors: (*Communists, Scientific research), (*Communists, Foreign policy), (*Research program administration, Information retrieval), Political science, Economics, Education, Scientific personnel, Control, Data, Economic warfare, Communism, Documentation, Data processing systems, Costs, Data storage systems.

The scientific and technological trends in communist countries cannot help but evoke a sense of urgency. If these trends continue, and if the communist ideology remains unchanged, the Free World must expect serious economic and political difficulties in the future. To help prevent this, we have focused our attention on what we consider to be the major problem areas - ineffective R&D cooperation of the Free World and its fragmented, cumbersome information system. As a partial solution we propose: a Free World alliance for science and technology; greater emphasis on education of scientists in countries emerging on the world scene; reduction of the one way flow of technical information to communist countries (or, inversely, increase our intake); a U. S. information system which would more effectively use government and private resources. (Author)

AD-430 608 Div. 30, 32
OTS price $2.60

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
ADVANCED LANGUAGE PROCESSING PROCEDURES,
by S. J. Keyser. Sep 63, 24p.
ESD TDR63 620 Unclassified report

Descriptors: (*Machine translation, Programming (Computers)), (*Programming languages, Machine translation), Data processing systems, Language.

A recent theoretical advance is outlined in the science of linguistics which renders possible the use of natural English as a query language in computer based systems. The advantages of this approach are considered. (Author)

AD-430 628 Div. 30, 2
OTS price $3.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
THE DYNAMIC BEHAVIOR OF THE CARBON HUMIDITY ELEMENT ML-476,
by Heinz H. Grote and Reinhold M. Marchgraber.
Aug 63, 31p.
DA Task 1A0 11001B021 02
AELRDL TR2379 Unclassified report

Descriptors: (*Atmospheric sounding, Humidity), (*Meteorological instruments, Humidity), (*Humidity, Atmospheric sounding), Carbon, Low-pass filters, Circuits, Controlled atmospheres, Test methods, Mathematical models, Differential equations.

Measurements of the step-function response of Carbon Humidity Element ML-476 taken at different environmental temperatures and with humidity steps of different magnitude are presented. The measurements were performed on a two-pressure system of high precision, with a test port modified to allow exposure of the elements under test to controlled humidity steps of negligible rise-time anywhere within the operating temperature range of the elements. The response characteristics obtained show a fast initial response followed by a slower drift to equilibrium. Mathematical models of second and third order for the response of the carbon element are given in a form which yields to the restoration of the input time function from the measured output of the humidity sensor. (Author)

AD-430 714 Div. 30
OTS price $.75

Behavioral Sciences Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
ERROR PROTECTED NAMES,
by Walter J. Huebner, Jr. Dec 63, 22p.
Contract AF33 657 7362, Proj. 7184, Task 718404
AMRL TDR63 83 Unclassified report

Report on Human Performance in Advanced Systems.

Descriptors: (*Coding, Errors), Test methods, Identification, Documentation, Data processing systems, Language, Detection, Automatic.

A method of generating error protected encoded information or error protected names was originated. Any single name resulting from the application of this system is unique in that at least two of its symbols differ from the symbols in corresponding positions of every other name. This property permits the detection of all errors involving single substitution or erroneous interchange of two symbols. In addition, this system will detect well over 97% of all other errors that might occur in transcribing a name. Name lists generated by the method described are particularly applicable to identification numbers, license plates, parts lists, etc, where mistaken identification is likely to be costly. A list of 961 three-symbol, error protected names is presented. Also presented is a table showing the number of error-protected names that can be generated with selected combinations of name-length and number of usable symbols. For example, with an alphabet of 23 symbols it is possible to generate a list of 6,400,000 error-protected, six-symbol names. The method of generating the lists is described in detail and the error-protective properties of such lists demonstrated mathematically. (Author)

AD-430 818 Div. 30, 25, 2
OTS price $9.60

Air Force Cambridge Research Labs., Bedford, Mass.
THE PROGRESS AND PRESENT STATUS OF SCIENCE IN INDIA,
by Hari K. Sen. Nov 63, 111p.
Proj. 8647
AFCRL 63 902 Unclassified report

Descriptors: (*Plasma physics, Scientific research), (*Geophysics, Scientific research), (*Astrophysics, Scientific research), Research program administration, Nuclear physics laboratories, Abstracts.

This report gives an account of the progress and present status of science in India. Its scope is in the main limited to developments of Indian science in plasma physics and geo-astrophysics. It does not attempt to describe all universities and research institutions in India. It does, however, give a fairly broad cross-section of Indian scientific research in the aforementioned fields. (Author)

AD-430 819 Div. 30, 15
OTS price $6.60

Parke Mathematical Labs., Inc., Carlisle, Mass.
A MATHEMATICAL MODEL FOR INPUT-OUTPUT DEVICES AND THEIR CONNECTIONS,
by L. Calabi and J. A. Riley. Nov 63, 62p.
Rept. no. SR5
Contract AF19 628 2417, Proj. 4608, Task 460805
AFCRL 64 4 Unclassified report

Descriptors: (*Input-output devices, Mathematical models), (*Computer logic, Theory), Computer storage devices, Computers, Switching circuits, Control systems, Sequences, Algebras, Functions, Operators (Mathematics), Mathematical logic, Groups (Mathematics), Pulse analyzers, Circuits.

Contents: Intuitive Discussion - Switches, Series and Parallel Connections; Control Connection, Input Contraction, Evaluation; Multiple-output Devices; Formal Theory - Operations on Sequences; The Substitution Algebra of Functions; Substitution Algebras of Devices; and Subalgebras; Homomorphisms; Completeness.

AD-430 892 Div. 30
OTS price $9.10

Directorate of Systems Dynamic Analysis, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
MIDAS PROGRAMMING GUIDE,
by R. T. Harnett, F. J. Sansom and L. M. Warshawsky. Jan 64, 110p.
Proj. 1523, Task 152304
SEG TDR64 1 Unclassified report

Descriptors: (*Digital computers, Handbooks), (*Differential equations, Programming (Computers), Circuits, Networks, Nonlinear differential equations, Errors.

This report is intended to serve as a working manual for the MIDAS (Modified Integration Digital Analog Simulator) computer program that provides digital solutions on an IBM 7090 (7094) computer for systems of ordinary differential equations. The program is primarily intended to be used for obtaining check solutions for analog computer simulations and this report is written from the viewpoint of an analog programmer. Since it features the use of floating point arithmetic and a variable step size integration routine, amplitude and time scaling are not required for the MIDAS solution. The check solution obtained via MIDAS can be used to provide this all-important information for the analog program. (Author)

AD-430 899 Div. 30, 23
OTS price $2.60

System Development Corp., Santa Monica, Calif.
THE COMPUTER AS AN INSTRUCTIONAL TOOL: A SUMMARY,
by Don D. Bushnell. 13 Feb 64, 25p. Rept. no. SP 1554
Unclassified report

Descriptors: (*Teaching machines, Education), (*Learning, Teaching machines), (*Education, Automation), (*Data processing systems, Education), Students, Computer, Training, Decision making, Training devices.

This report discusses the developments in computer-based teaching machines, rapid information retrieval systems, and the advances in computer technology for aiding teachers and counselors in the diagnosis of student learning needs and in selecting appropriate teaching strategies seem to be the primary factors holding the attention of the researchers responsible for innovations in educational data processing. It also reports that by approaching educational data processing with emphasis on instructional systems, we gain a broader perspective on the potential of computer technology in education. Progress must be made not only in data processing technology, but in our knowledge of educational requirements. Concludes that more must be learned about the kinds of information needed by students, teachers, counselors, and administrators and standardized methods must be developed for coding and recording this information, so that high-speed processing techniques can be used efficiently. (Author)

AD-430 926 Div. 30
OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
RADIOMETRIC MEASUREMENTS AT 8.5-MM WAVELENGTH WITH A 28-FOOT ANTENNA DURING DECEMBER 1962,
by V. L. Lynn, M. L. Meeks and M. D. Sohigian.
8 Oct 63, 32p. TR330
Contract AF19 628 500
ESD TDR63 590 Unclassified report

Descriptors: (*Radiometers, Measurement), Extremely high frequency, Venus, Temperature, Brightness, Instrumentation, Jupiter, Moon, Parabolic antennas.

A precisely calibrated 28-foot antenna, operating at a wavelength of 8.5mm with a beamwidth of 4.3 ft, has been utilized to observe emission from Venus near inferior conjuction, from the region of Taurus A and from the moon. Simultaneous observations at 12mm with the same antenna are described in a current report by the Research Laboratory of Electronics (M.I.T.). The brightness temperature of Venus, observed approximately one month after inferior conjunction, was found to be 380 degrees (+72 degrees, -34 degrees)K, in close agreement with previously reported results. Observations of Taurus A in the millimeter band have been previously reported only by Kluz'min and Salomonovich (1961) at 8mm. They observed the presence of a second source to the east of Taurus A. Some evidence was found to support the existence of this second source but the results are inconclusive. Taurus A was found to have a width of 2.4 ft ± 0.5 ft. in right ascension. (Author)

AD-430 947 Div. 30, 31
OTS price $2.60

David Taylor Model Basin, Washington, D. C.
THE DAVID TAYLOR MODEL BASIN TWO-COMPONENT PALLOGRAPH,
by Richard L. Price. May 63, 26p.
DTMB 1730 Unclassified report

Descriptors: (*Vibration, Measurement), (*Seismographs, Ships), Test equipment, Instrumentation, Recording systems, Recording paper, Motion.

The TMB Two Component Pallograph described is a simple seismic device designed and developed at the David Taylor Model Basin. The instrument's characteristics and capabilities are mentioned and a complete alignment and operating procedure are given. (Author)

AD-430 989 Div. 30, 28
OTS price $9.10

Human Engineering Lab., Aberdeen Proving Ground, Md.
PLATOON WEAPONS PREFERENCE: A QUESTIONNAIRE STUDY PSYCHOLOGICAL WEAPONS STUDY I,
by Kenneth R. Laughery and Robert W. Bauer.
Nov 63, 107p.
HEL TM18 63 Unclassified report

Descriptors: (*Psychological warfare, Military personnel), (*Weapons, Psychology), (*Armed forces (United states), Psychometrics), Analysis, Data processing systems, Statistical analysis, Safety.

This study of the psychological effects of weapons followed the general plan of a similar research project reported by Vaughan and Walker in 1957. The earlier study measured the dangerousness of the weapons as perceived by troops being fired upon, whereas the present study measured the preference for use of the weapons in action. In addition, this study related preference to experience with and knowledge of the weapons. Sixty-one enlisted men completed a paired-comparison rating form and provided additional questionnaire information. Weapons rated were the M-1 rifle, Browning automatic rifle, light machine gun, 81-mm. mortar, hand grenade, and 106-mm. recoilless rifle. The weapons were assessed for use in both offense and defense. (Author)

AD-431 046 Div. 30, 9
OTS price $2.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
CONDENSATION IN HOTSHOT TUNNELS,
by B. J. Griffith, H. E. Deskins and H. R. Little. Feb 64, 27p.
Contract AF40 600 1000, ARO Proj. VT2402
AEDC TDR64 35 Unclassified report

Descriptors: (*Hypersonic wind tunnels, Condensation), (*Nitrogen, Condensation), Hypersonic wind tunnels, Flat-plate models, Pressure, Heat transfer, Temperature, Stagnation point, Air.

Tests have been conducted to determine the effects of condensation of nitrogen in the AEDC Hotshot Tunnels H and F. Free-stream static pressure was determined by an extrapolation of sharp flat-plate pressure data and an analysis of the nozzle static pressures. It is shown that the amount of supersaturation that can be achieved at high Mach numbers in air can also be obtained using nitrogen as the test gas. (Author)

AD-431 054 Div. 30
OTS price $1.10

System Development Corp., Santa Monica, Calif.
AUTOMATED SYSTEM IMPLEMENTATION, PRELIMINARY STUDY REPORT,
by Michael R. Lackner and Patricia Kribs.
10 Feb 64, 10p. Rept. no. TM1742 000 00
Unclassified report

Descriptors: (*Data processing systems, Design), Operation, Scheduling.

The report describes the Automated System Implementation (ASI) Project which was designed to identify and initiate research activities necessary for the development of automated system implementation on technology. A six-month period of study and exploration has been completed. The object of this research is to specify and develop techniques which can become coherent components of a highly automated scheme for implementing information processing systems, will be independently useful in developing information processing systems, and can be established as feasible within a two-year period. (Author)

AD-431 055 Div. 30, 15
OTS price $1.60

System Development Corp., Santa Monica, Calif.
APPLICATION OF DYNAMIC PROGRAMMING TO STOCHASTIC TIME OPTIMAL CONTROL,
by M. Ash. 31 Jan 64, 13p. Rept. no. SP1363 000 00
Unclassified report

Descriptors: (*Stochastic processes, Adaptive control systems), (*Mathematical logic, Theory), Nonlinear systems, Optimization, Time, Equations of state, Probability, Distribution, Trajectories.

A non-linear control process is discussed where the control is bounded as absolute value. A random element (noise) that appears additively as part of the control variable is assumed. The performance criterion of driving the system back to equilibrium from its present perturbed state in minimum ''expected'' time, due to the presence of the random noise is used. The principle of optimality of dynamic programming to derive a novel partial differential equation in the minimum expected time is applied. Solutions of this equation yield the optimal control policy, which is bang bang. Specifically, far from the origin of the corresponding phase space, the control is set, once only, to drive the system into the linear region near the origin. In the linear region, the control switching sequence corresponding to Bushaw's theorem ensues. (Author)

AD-431 056 Div. 30, 15
OTS price $4.60

System Development Corp., Santa Monica, Calif.
EXPERIMENTS WITH A THEOREM-UTILIZING PROGRAM,
by Larry E. Travis. 5 Feb 64, 48p. Rept. no. SP1402 000 01
Unclassified report

Descriptors: (*Metamathematics, Programming (Computers)), (*Programming (Computers), Metamathematics), Pattern recognition, Computer logic, Artificial intelligence, Bionics, Sequences, Data processing systems, Mathematical logic, Geometry, Communication theory, Programming languages.

A discussion is presented of the issue of the importance for machines of acquiring skill as human beings do, by learning theorems, and developing sensitivity to the occasions on which it is appropriate to apply them. It is reported that a theorem-learning-and-utilizing program has been written and tested in a simple but paradigmatic problem domains. Also that although the program does solve problems, in some cases rather well, each version of it reached a threshold beyond which increase and modification of its theorem store did little to improve its problem-solving power. Experiments with the program suggest that there may be no practical way to achieve machines very skillful at solving difficult sequence-synthesizing problems unless they can be empowered with something like an effective theorem-utilizing ability. Further, the experiments point to many difficulties which stand in the way of empowering machines with such an ability in interesting problem domains, especially difficulties associated with pattern recognition and with integrating isolated previously proved theorems into general solution schemata. (Author)

AD-431 059 Div. 30
OTS price $1.60

Systems Development Corp., Santa Monica, Calif.
APPROACHES TO TESTING THEORIES OF ORGANIZATION DESIGN,
by John T. Gullahorn and Jeanne E. Gullahorn.
3 Jan 64, 16p. Rept. no. SP1238 000 01
Unclassified report

Descriptors: (*Models (Simulations), Design), (*Group dynamics, Theory), Tests, Social communication, Simulation, Computers, Verbal behavior, Experimental data, Behavior, Mathematical models.

Among conventional approaches to testing theories of organization design is the pilot plant study, a field approximation to the laboratory investigation. Problems of ethics are raised by the experimental manipulation of people in continuing role relationships that have significance for their self-definitions. Small-group studies or more abstract investigations of mathematical models of theoretical constructs provide variables. Computer simulation provides a vehicle for assessing the dynamic implications of relatively large systems of theoretical constructs. Translating a verbal formulation into the more precise language of a computer model enables the theorist to pre-test experimental manipulations, introduce a broader range of variables than ordinarily feasible in laboratory studies, and run numerous replications in order to acquire evidence concerning the extended outcomes that follow logically from the hypothesized processes of his formal system. (Author)

AD-431 132 Div. 30, 8
OTS price $8.10

University of Southern Calif., Los Angeles.
A THEORETICAL AND EXPERIMENTAL ANALYSIS OF AN EIGHTEEN STAGE RADIO-FREQUENCY MASS SPECTROMETER,
by Gurdev Singh Bajwa. 31 July 62, 82p.
Contract Nonr22811
Unclassified report

Descriptors: (*Mass spectroscopy, Radiofrequency), Design, Equations, Ionization chambers, Electrodes, Gain, Calibration, Electron tubes, Electron tube parts, Integral equations, Resolution, Radiofrequency oscillators, Stability, Errors, Tuned amplifiers.

An eighteen stage radio-frequency mass spectrometer has been designed and constructed for use in the 2-meter grazing incidence vacuum monochromator existing at USC, and a thorough study regarding its operational characterisitics was made. The values of maximum energy gain G sub m and the tuning frequency f were obtained experimentally. A method has been described for taking into consideration the errors introduced by small variations in the output signal voltage of the radio-frequency oscillator. Simultaneous measurements of resolving power and relative transmission showed that the instrument gave best performance for V sub s/ V sub i between 0.06 and 0.11. Due to the instability in the output of the radiofrequency oscillator and the weak nature of the ionizing source, light from a hydrogen glow discharge, it was not possible to operate the instrument at values of V sub r higher that 95% of maximum energy gain. The performance of this instrument seems to be better than the three stage Bennet type analyzer used by Herzog and Marmo, with a similar ionization source. (Author)

AD-431 189 Div. 30, 7
OTS price $3.00

Rocketdyne, Canoga Park, Calif.
FEASIBILITY INVESTIGATION OF HEAT-FLOWRATE MEASURING TECHNIQUES.

Final rept., Dec 62-Aug 63,
by J. J. Vrolyk and P. A. Kinzie. Jan 64, 152p.
Rept. no. R5286
Contract AF33 657 8109, Proj. 8224, Task 822404
RTD TDR63 4077 Unclassified report

Descriptors: (*Heat transfer, Temperature sensitive elements). (*Temperature sensitive elements, Transducers). (*Transducers, Design). Construction, Temperature, Thermoelectricity, Thermocouples, Thermal conductivity, Circuits, Photoengraving, Manufacturing methods, Copper, Steel, Calorimeters, Errors, Copper alloys, Nickel alloys, Measurement, Miniature electrical equipment.

The design of a zero blockage heat-flowrate transducer is discussed. The measuring technique is one in which: (1) all of the flow measured is normal to and passes through two precisely located cross sections of a thermally conducting material, and (2) the electrical output is a precise measure of the integral average differential temperature between these cross sections and is proportional to the heat flowrate through them. Fabrication techniques are considered, and a step-by-step description of the assembly of an experimental transducer is described. The finished transducer was calibrated in the heat-flux range of 0 to 2.5 Btu/sec-sq in. and was used to measure steady-state and transient heat flux as high as 4.1 Btu/sec-sq in. Hot-side temperatures up to 865 F (463 C) were reached. It was concluded that it is feasible to use miniaturized transducers, which can be installed directly in thin walls without special cooling provision, to measure high steady-state or dynamic heat flux. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-430 043 Div. 31, 2
OTS price $2.60

New York U., N. Y.
A REPORT ON THE CONVERSION OF U. S. ARMY T-BOAT 427 TO AN OCEANOGRAPHIC RESEARCH VESSEL,
by James Gibbons. Nov 63, 25p. Rept. no. 63 14
Contract Nonr285 57
Unclassified report

Descriptors: (*Oceanographic vessels, Design), Oceanographic equipment, Naval research, Test facilities, Stability, Marine engineering.

The basic work consisted of the following tasks: (1) cleaning and painting of hull, superstructure and interior spaces; reconditioning of machinery and equipment, addition of electronic aids to navigation, addition of a 20 KW AC generating plant and associated distribution system, addition of 5 tons of iron ballast, and a complete renovation of the existing cargo hold for laboratory use; (2) providing living accomodations and the installation of scientific equipment; (3) the installation of a Hydrographic winch; and (4) the addition of sponsons (containing additional fuel oil tanks) and bilge keels. (Author)

AD-430 115 Div. 31, 8
OTS price $4.60

Computer Usage Co., Inc., New York.
SUBIC COMPUTER CONCEPT STUDY. VOLUME I.
Final rept.
1 July 63, 42p. Rept. no. U417 63 063
Contract NOnr251200
Unclassified report

Subcontract to Electric Boat Div., General Dynamics Corp., Groton, Conn., Contract Nonr 251200.

Descriptors: (*Submarines, Data processing systems), (*Control systems, Submarines), Digital computers, Command and control systems, Fire control systems, Navigation, Sonar, Real-time, Modules (Electronic), Fire control computers, Navigation computers, Combat information centers.

The SUBIC computer concept study was undertaken to determine the computer system which would meet the requirements of an integrated submarine control system. Phase I determines data processing tasks which are representative of the types of processing which might be performed by the SUBIC computer system. Phase II determines the overall computer requirements based on the processing requirements defined in Phase I. Problems inherent in the development of a real time computer control system are also discussed. Phase III develops a methodology for evaluating computer control systems. The methodology developed in Phase III is applied to the tasks defined in Phase I to evaluate the methodology and derive some feeling for the characteristics of the computer system required. The application of the method comprises Phase IV of the study. The conclusions are that vulnerability is a critical criteria in evaluating alternative computer systems. To minimize vulnerability, the equipment should be designed in a highly modular fashion and shock mounted to minimize the probability of equipment failures when subjected to shock of the type anticipated in tactical situations where targets are being tracked. (Author)

AD-430 230 Div. 31, 9
OTS price $2.60

David Taylor Model Basin, Washington, D. C.
DEVELOPMENT AND MODEL TESTS OF AN EFFICIENT PLANING HULL DESIGN,
by Eugene P. Clement. Apr 59, 17p.
Proj. NS715 102
DTMB 1314 Unclassified report

Descriptors: (*Boats, Hulls (Marine)), (*Hulls (Marine), Planing surfaces), Design, Model tests, Hydrodynamics, Performance (Engineering), Velocity, Friction, Test methods, Drag, Hydrodynamic configurations.

A hull form for a stepless planing boat was designed, based upon an analysis of the results of resistance tests of a number of previous designs, and also taking into consideration the features desirable for good steering qualities and good rough-water performance. A model was built and tested, and the results were compared with the resistance data from designs which had been previously tested at the Model Basin. This comparison showed that the new design has appreciably less resistance than the earlier designs at all except very low speeds. The new design was also tested at a wide range of hull loadings and LCG locations, and these results are presented. (Author)

AD-430 296 Div. 31
OTS price $1.60

David Taylor Model Basin, Washington, D. C.
HYDROSTATIC PRESSURE TESTS OF AN UNSTIFFENED CYLINDRICAL SHELL OF A GLASS-FIBER REINFORCED EPOXY RESIN,
by John G. Pulos and John E. Buhl, Jr. Apr 60, 15p.
Proj. S F013 0302
DTMB 1413 Unclassified report

Descriptors: (*Pressure vessels, Stresses), (*Cylindrical bodies, Hydrostatic pressure), (*Submarine hulls, Plastics), Epoxy plastics, Glass textiles, Buckling (Mechanics), Loading (Mechanics), Creep, Reinforcing materials, Structural shells, Tests, Load distribution.

An unstiffened cylindrical shell of 32.67 in. mean diameter, built up of layers of an epoxy resin tape reinforced with glass fibers, was tested to collapse under external hydrostatic pressure. The shell structure failed at a pressure of 3735 psi, which is in good agreement with the pressure calculated from the elastic shell-buckling equations of von Mises. A longitudinal tear accompanied by some delamination of the layers was observed over the entire length of the cylinder. (Author)

AD-430 452 Div. 31
OTS price $1.10

Naval Research Lab., Washington, D. C.
STRUCTURAL PLASTICS FOR DEEP SUBMERGENCE VEHICLES.
Quarterly status rept., 1 Oct-31 Dec 63.
1 Feb 64, 4p.
Projs. S R007 03 04, S F013 01 03; Tasks 1008, 217
Unclassified report

Descriptors: (*Epoxy plastics, Reinforcing materials), (*Reinforcing materials, Glass textiles), (*Glass textiles, Reinforcing materials), Shear stresses, Tensile properties, Failure (Mechanics), Submarine hulls, Mechanical properties, Pressure, Configuration, Chemical properties.

AD-430 622 Div. 31
OTS price $3.60

David Taylor Model Basin, Washington, D. C.
CALCULATED NATURAL FREQUENCIES, NORMAL MODES, AND FORCED VIBRATIONS OF USS SKATE (SSN 578),
by R. Michael Murray, Jr. Aug 63, 36p.
Proj. S F013 11 01
DTMB 1767 Unclassified report

Descriptors: (*Submarine hulls, Vibration), (*Vibration, Underwater), (*Mathematical analysis, Vibration), (*Nuclear powered vessels, Submarine hulls), Resonance, Stresses, Frequency, Programming (Computers), Models (Simulations).

Normal mode shapes and natural frequencies of horizontal and vertical flexural vibrations of the hull and longitudinal vibration of the hull-propulsion system were calculated on a digital computer for USS SKATE (SSN 578). Electric analog analysis of the longitudinal modes was also carried out. Forced damped vibration characteristics for vertical flexural and longitudinal modes were determined as well as the effect of different thrust-bearing-foundation spring constants on the longitudinal mode shapes of the combined hull-propulsion system. Longitudinal mode shapes, computed by both digital and analog methods, show good agreement. Vertical and horizontal flexural mode shapes for both surfaced and submerged ship conditions were calculated using a variable Lewis virtual mass coefficient. Also, vertical flexural mode shapes for both ship conditions were computed using the standard two-node Lewis coefficient. The results of the two types of analyses are presented. (Author)

AD-430 633 Div. 31, 9
OTS price $2.60

David Taylor Model Basin, Washington, D. C.
SHIPBOARD VIBRATION AND NOISE CONSIDERATIONS IN THE DESIGN OF RIVER TOWBOATS,
by Edward F. Noonan and Angelos Zaloumis. Jul 63, 21p.
Proj. S F013 11 01, Task 1351
DTMB 1758 Unclassified report

Presented at the Marine Propulsion Meeting of the Society of Automotive Engineers, 14 May 1963, St. Louis, Mo.

Descriptors: (*Tugs, Rivers), (*Ship hulls, Tugs), (*Vibration, Ship hulls), Water waves, Noise, Stresses, Vibrators (Mechanical), Propellers (Marine), Mechanical properties, Design.

The problems of vibration and noise aboard ship have been given increased attention by the Navy since World War II as a result of many technological developments and tactical requirements. Many problem areas are identified and those which have particular application in the design of river towboats are reviewed. The paper is addressed primarily to the naval architect, shipbuilder, or operator and identifies those areas to which attention should be drawn during design and development. Specific suggestions and specifications are presented, based on current naval practice. (Author)

AD-430 666 Div. 31
OTS price $9.60

Long Beach Naval Shipyard, Calif.
COLLECTION OF REPORTS OF VIBRATION SURVEYS.
4 Oct 61, 16p.
Unclassified report

Descriptors: (*Ship structural components, Vibration), (*Vibration, Naval vessels (Combatant)), Naval vessels (Support), Motor generators, Ship hulls.

AD-430 686 Div. 31
OTS price $2.60

Lehigh U., Bethlehem, Pa.
SELECTION OF STEELS FOR HEAVY-SECTION SHIP PLATE.
Progress rept. no. 1,
by R. D. Stout, C. R. Roper and D. A. Magee.
7 Feb 64, 29p.
Contract NObs84829, Proj. SR162
SSC 160 Unclassified report

Descriptors: (*Flat plate models, Thickness), (*Ship hulls, Materials), (*Ship plates, Materials), Heat treatment, Metallurgy, Brittleness, Fracture mechanics, Sensitivity, Cooling, Microstructure, Plasticity, Deformation, Impact shock.

In the design and construction of ships of large tonnages, one of the most pressing problems is the selection of hull material thatwill provide a suitable combination of strength, weldability, and resistance to brittle fracture. The Ship Steel Committee initiated Project SR-162 at Lehigh University to develop information which would enable the selection of the optimum composition and heat treatment of ship steel for use in heavy sections. (Author)

AD-430 742 Div. 31
OTS price $7.60

Lessells and Associates Inc., Waltham, Mass.
ACQUISITION AND ANALYSIS OF ACCELERATION DATA.
Progress rept. no. 3,
by F. C. Bailey, D. J. Fritch and N. S. Wise.
17 Feb 64, 71p.
Contract NObs88451, Proj. SR153
SSC 159 Unclassified report

Report on Ship Response Statistics.

Descriptors: (*Cargo ships, Acceleration), (*Acceleration, Cargo ships), Ocean waves, Motion, Loading (Mechanics), Accelerometers, Recording systems, Experimental data, Mathematical prediction, Atlantic ocean, Analyses, Cargo, Instrumentation.

Efforts concern a program to record and analyze seaway induced accelerations at representative locations on a dry cargo vessel over a long period of time with a view toward establishing extreme values of accelerations which might be encountered by the vessel and to characterize the above acceleration data in terms which will be of direct assistance in predicting extreme values of load conditions to which cargo would be subjected. Seven accelerometers and an unmanned recording system were installed aboard the S. S. Wolverine State on regular North Atlantic service, and data were obtained over a period of 15 months. It is possible to make only general recommendations relative to control of cargo loads since this investigation was limited to a single ship-type and route. Conclusions and recommendations are presented. (Author)

AD-430 821 Div. 31
OTS price $1.60

David Taylor Model Basin, Washington, D. C.
PERFORMANCE OF MODIFIED AO 22-CLASS TANKER PREDICTED FROM TESTS WITH MODEL 4895,
by A. Q. Aquino. Sep 63, 17p.
Proj. S F013 02 04
DTMB 1749 Unclassified report

Descriptors: (*Tankers, Model tests), (*Model tests, Performance (Engineering)), Hydrodynamics, Velocity, Propulsion, Ship hulls, Propellers (Marine), Configuration.

Model 4895 was constructed by the David Taylor Model Basin to represent a jumboized design of the AO 22-Class Tanker. Resistance and propulsion tests were conducted to determine the ability of the enlarged ship to maintain an acceptable speed with existing shaft horsepower of 13,500. Model tests indicate that at the design condition, the prototype of Model 4895 will attain a speed of 17.6 knots while absorbing 13,500 shp at 101 rpm. (Author)

AD-430 838 Div. 31, 30, 33
OTS price $14.50

Naval Air Test Facility, Lakehurst, N. J.
DESIGN AND STRESS ANALYSIS OF STEAM CATAPULT ACCUMULATORS,
by C. Carroll Brice. 9 Jan 64, 220p.
NATF SI EI 99 Unclassified report

Descriptors: (*Catapults, Steam), Pressure vessels, Design, Stresses, Analysis, Pressure, Thermal stresses, Fatigue (Mechanics), Mounting brackets, Launching, Naval aircraft, Test facilities, Nozzles, Aircraft.

The steam accumulators which are to be installed at the TC13 catapult site, Naval Air Test Facility (Ship Installations) Lakehurst, New Jersey have been designed and analyzed in accordance with standard codes to insure safe operation for a specified type and number of catapult service cycles. The number of types of service cycles is infinite according to aircraft weights and end speeds, stand-by pressures, and charge-up and blow-down rates. For this report two representative cycles were selected for analysis: a typical high pressure catapult shot and a wide range charge-up blow-down operation. (Author)

AD-430 839 Div. 31, 30, 33
OTS price $11.00

Naval Air Test Facility, Lakehurst, N. J.
STRESS ANALYSIS OF EXISTING TC13 STEAM ACCUMULATORS,
by C. Carroll Brice. 9 Jan 64, 148p.
NATF SI EI 98 Unclassified report

Descriptors: (*Catapults, Steam), Pressure vesels, Fatigue (Mechanics), Failure (Mechanics), Life expectancy, Stresses, Analysis, Exhaust nozzles, Tests, Performance (Engineering), Naval aircraft, Test facilities, Launching, Aircraft.

This stress analysis was prepared for the purpose of determining the safe fatigue life of the existing TC13 steam accumulators and of establishing a set of test-site operating procedures. Cracks were found at various locations on the inner surfaces of the steam accumulators which have been in use since 1958 at the U. S. Naval Air Test Facility (Ship Installations) (NATF(SI)). These cracks, if not repaired, may propagate and cause the vessel to rupture. The cracking phenomenon is, therefore, extremely hazardous. (Author)

AD 430 840 Div. 31, 30, 33
OTS price $4.60

Naval Air Test Facility, Lakehurst, N. J.
A STUDY OF METHODS FOR EXTENDING FATIGUE LIFE OF CATAPULT ACCUMULATORS,
by C. Carroll Brice. 9 Jan 64, 45p.
NATF SI EI100 Unclassified report

Descriptors: (*Catapults, Steam), Life expectancy, Fatigue (Mechanics), Pressure vessels, Failure (Mechanics), Thermal stresses, Pressure, Stresses, Design, Construction, Thermal insulations, Thickness, Heat transfer, Thermal conductance, Maintenance, Naval aircraft, Test facilities, Launching, Aircraft, Nozzles.

This study was made to determine if the fatigue life of a steam accumulator can be extended by any of a number of methods. Six separate studies investigate analytically or logically the possible methods. As discussed where appropriate, some methods can be completely evaluated only by both studies and test data. The problem in accumulator design is that the observed fatigue life as manifested by cracking has been found to be less than the calculated fatigue life. Inspection of accumulators in fleet service has revealed extensive cracking near the manhole and near the nozzles. The accumulators which are installed at N.A.T.F., Lakehurst, New Jersey have had severe cracking at the head shell junction and at some nozzles. Almost all cracking has occurred on the inside surfaces. (Author)

AD-430 895 Div. 31, 9
OTS price $17.00

General Dynamics/Convair, San Diego, Calif.
EXPERIMENTAL INVESTIGATIONS OF SUPERCAVITATING HYDROFOILS WITH FLAPS. APPENDIX A,
by A. C. Conolly. Dec 63, 264p. Rept. no. 63 210
Contract NObs84615
Unclassified report

Descriptors: (*Hydrofoils, Experimental data), (*Aerodynamic configurations, Hydrofoils), Tables, Flaps, Aerodynamic characteristics.

AD-431 155 Div. 31, 9
OTS price $2.60

David Taylor Model Basin, Washington, D. C.
WAKE SURVEY AND FLOW STUDIES FOR A SURVEY SHIP (AGS) REPRESENTED BY MODEL 4914,
by M. S. Harper and E. E. West. Nov 62, 23p.
DTMB 1642 2 Unclassified report

Descriptors: (*Ship models, Fluid dynamic properties), Propellers (Marine), Model basins, Model tests, Design, Velocity, Wake, Hydrodynamic configurations, Data.

Model tests conducted to predict the performance of a design of a single-screw survey vessel (AGS). This paper reports the results of a velocity study of Model 4910 in the 15-foot draft condition as well as flow pattern over the hull of this model observed in the circulating water channel at speeds equivalent to 6, 12, and 15 knots full scale. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-429 350 Div. 32
OTS price $8.10

RAND Corp., Santa Monica, Calif.
COMMODITY POLICY AND ECONOMIC DEVELOPMENT,
by John A. Pincus. Oct 63, 81p. Rept. no. RM3887 ISA
Contract SD79, ARPA Order 189 61
Unclassified report

Descriptors: (*Economics, Industrial production), (*Commerce, Costs), (*Commerce, Foreign policy), Political science, Coffee, Beverages, Fruits, Carbohydrates.

Alternative sources are discussed of foreign exchange, and conclusions are made that none of these are likely to compensate fully for the decline in commodity prices. A commodity-by-commodity discussion of the impact of a system of effective international price-fixing agreements on the foreign exchange earnings of underdeveloped countries, both individually and in the aggregate is presented. The Memorandum then analyzes the conditions required to make such agreements effective in fixing prices, and also analyzes the arguments for and against entering agreements of this nature, whether or not effective. On the basis of this analysis and discussion, given certain assumptions about demand elasticities, a system of price-fixing commodity agreements to establish long-run monopoly prices for five commodities, could result, over the current decade, in an average annual increase of foreign exchange earnings of nearly $800 million to the less developed countries. Finally, it is pointed out that many countries export corps unsuited to the commodity agreement technique, and would not be helped by these agreements. (Author)

AD-429 370 Div. 32
OTS price $1.60

RAND Corp., Santa Monica, Calif.
INDONESIA IN 1963. THE YEAR OF WASTED OPPORTUNITIES,
by Guy J. Pauker. Jan 64, 14p. Rept. no. P2855
Unclassified report

Descriptors: (*Foreign policy, Communism), (*Political science, Foreign policy), Armed forces (Foreign), Population.

AD-429 380 Div. 32, 1
OTS price $8.60

RAND Corp., Santa Monica, Calif.
CIVIL AVIATION AND U.S. FOREIGN AID: PURPOSES, PITFALLS, AND PROBLEMS FOR U.S. POLICY,
by Hans Heymann, Jr. Jan 64, 87p. Rept. no. R424 RC
Unclassified report

Descriptors: (*Foreign policy, Civil aviation), (*Civil aviation, Foreign policy), Economics, Effectiveness, Air transportation.

Over a six-year period (1956-1961), the United States provided almost $300 million in assistance to civil aviation in underdeveloped countries. The dominant factor in shaping this aviation assistance, from a public policy point of view, was the U.S. desire to promote the cause of international air transport, to enlarge the American role in it, and to derive some political benefits as a consequence. Little support is found for the belief that U.S. foreign policy purposes are especially well served by an enlarged American aviation presence in underdeveloped areas. This study concludes that U.S. aid programs have given insufficient attention to the positive economic and social development possibilities inherent in aviation. (Author)

AD-429 451 Div. 32, 20, 25
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PLANET, PHYSICS, MANKIND,
by M. Pasechnik. 6 Jan 64, 9p.
FTD TT63 1148 Unclassified report

Trans. from Pravda Ukrainy, pp. 3, 1 Aug. 61.

Descriptors: (*Scientific research, Communism), (*Nuclear physics, Scientific research), Solid state physics, Nuclear energy, Thermonuclear reactions, Propaganda.

AD-429 508 Div. 32, 7
OTS price $1.60

Bureau of Naval Personnel, Washington, D. C.
PROGRAMMED INSTRUCTION IN BASIC ELECTRICITY,
by Lloyd S. Standlee, Eugene A. Hooprich, and John LaGaipa. Aug 63, 15p.
NAVPERS TB63 10 Unclassified report

Descriptors: (*Learning, Instruction manuals), (*Training devices, Learning), Electricity, Instructors, Test methods, Students, Textbooks.

Students in eight classes of the Basic Sonarman (Surface) Course were taught basic electricity under the experimental conditions of programed vs. conventional method of instruction, high vs. lower qualified instructors, and easy (DC) vs. difficult (AC) subject matter. No one method of instruction, ability level of instructors, or difficulty level of subject matter was found consistently to yield superior student achievement. Nor were there consistent interaction effects. Over-all there was a tendency for students to achieve slightly more under the programed method of instruction. Students' attitudes were more favorable toward the programed method of instruction when the subject matter was relatively easy (DC) than when the subject matter was difficult (AC). Instructors' attitudes toward programed instruction tended to be negative. Students and instructors agreed, however, that the programed materials were relatively easy to read. Though the programed method of instruction tended to be slightly superior in terms of objective tests of student achievement, both students and instructors thought that the programed materials should be used to supplement rather than to replace conventional methods of instruction. (Author)

AD-429 524 Div. 32
OTS price $8.10

RAND Corp., Santa Monica, Calif.
STUDIES OF PREDICATION IN RUSSIAN-I. PREDICATIVE CASE, SHORT FORM ADJECTIVES AND PREDICATIVES,
by Henrik Birnbaum. Jan 64, 79p. Memo RM3774PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Language, Mathematical prediction), Theory.

Members of the glossematic school have suggested that a separate predicative case be set up in Russian on the basis of the exclusive predicative use of the short adjectival forms. In this paper the validity of such a new case, as distinct from the nominative, is discussed and eventually re-

jected on the grounds that the predicative case-function is not restricted to the traditional nominative (from which the ''predicative'' would have to be spearated out), but also embraces the instrumental, and that in certain (active/passive) transformations the alleged ''predicative'' cannot be retained to denote predicative function and must be replaced by the instrumental. (Author)

AD-429 743 Div. 32, 28
OTS price $9.10

Delaware U., Newark.
THREAT PERCEPTION, TRUST AND RESPONSIVENESS IN INTERNATIONAL BEHAVIOR,
by Dean G. Pruitt. 9 Jan 64, 103p. Technical Report no. 11
Contract Nonr2285 02
Unclassified report

Descriptors: (*Political science, Attitudes), (*Perception, Political science), Decision making, Reasoning, Public opinion, Behavior, Group dynamics, Foreign policy, Cold war.

Certain aspects of international behavior can be attributed to the images of other nations held by individual people. Three kinds of image are particularly important: threat perception, distrust (together with its opposite, trust) and responsiveness. Threat perception leads to the adoption of defensive tactics and also produces psychological tensions that may impair the quality of national problem solving. Distrust is a more basic perception of another nation and may underlie threat perception in addition to producing such phenomena as a tendency to blame the other nation for all misfortunes and to fail to analyze the motives of its leaders. Level of responsiveness is negatively correlated with the harshness of tactics recommended for dealing with another nation and positively related to the likelihood of seeing middle ground in negotiations with that nation. (Author)

AD-429 896 Div. 32
OTS price $2.60

RAND Corp., Santa Monica, Calif.
SINO-SOVIET CONFLICT IN THE UNDERDEVELOPED COUNTRIES,
by Herbert S. Dinerstein. Jan 64, 26p. Rept. no. P2857
Unclassified report

Descriptors: (*Communist, Foreign policy), Social science, Communism, Nuclear warfare, Population, Starvation, Political science, Public relations, Industrial production.

AD-429 978 Div. 32
OTS price $3.60

RAND Corp., Santa Monica, Calif.
COMMUNIST CHINA'S MILITARY DOCTRINE AND STRATEGY,
by Alice Langley Hsieh. Oct 63, 38p. RM3833PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Communists, Military strategy) (*Military strategy, Communists), War potential, Military organizations, Limited war, Military tactics, Political science, Chemical warfare, Biological warfare, Weapons, Nuclear weapons, Air defense command, Air Force, Armed forces (Foreign) training, Armed forces (United States), Armed forces operations vulnerability.

AD-429 982 Div. 32, 26
OTS price $1.10

RAND Corp., Santa Monica, Calif.
AN ECONOMIST LOOKS AT R&D MANAGEMENT,
by Thomas K. Glennan, Jr. Nov 63, 9p. Rept. no. P2819
Unclassified report

Descriptors: (*Economics, Management engineering), (*Management engineering, Economics), (*Research program adminstration, Engineering management), Costs, Analysis.

AD-429 983 Div. 32
OTS price $2.60

RAND Corp., Santa Monica, Calif.
THE SOVIET VOICE IN THE EAST-WEST STRATEGIC DIALOGUE,
by Thomas W. Wolfe. Jan 64, 22p. Rept. no. P2851
Unclassified report

Descriptors: (*Communism, Military strategy), (*Foreign policy, Communists), (*United States government, Foreign policy), Military strategy, Communists, War potential, Armament, Armed forces (Foreign), Leadership.

AD-430 000 Div. 32
OTS price $9.60

Datatrol Corp., Silver Spring, Md.
COMMON VOCABULARY APPROACHES FOR GOVERNMENT SCIENTIFIC AND TECHNICAL INFORMATION SYSTEMS.
Dec 63, 108p. Technical rept. no. IR10
Contract NSF C342
Unclassified report

Descriptors: (*Information retrieval, Vocabulary), (*Subject indexing, Vocabulary), Design, Automation, Data processing systems, Data storage systems, Maintenance.

The present study, which takes a broader look into the vocabulary problem, was given added impetus by the more recent interest of the Committee on Scientific Information (COSI) of the Federal Council for Science and Technology. Specifically, the objective of this study was to develop and document guidelines and criteria to be used in reaching a decision on a single Government-wide approach to an information retrieval vocabulary. The main body of the report centers on a discussion of the various alternatives. In studying the many ramifications of the problem, however, certain ancillary data were acquired or developed which, while not directly dealing with the vocabulary problem, appeared to be pertinent to the broader problem of the over-all flow of scientific information; these are presented in the Appendix to the report. (Author)

AD-430 269 Div. 32
OTS price $5.60

System Development Corp., Santa Monica, Calif.
EVALUATION OF THE 1963 A D I MEETING,
by Carlos A. Cuadra. 15 Jan 64, 57p. Rept. no. SP1514
Unclassified report

Descriptors: (*Documentation, Information retrieval), (*Information retrieval, Documentation), (*Symposia, Documentation), Effectiveness, Analysis, Computers.

This report analyzes a questionnaire completed by 235 attendees at the 26th Annual Meeting of

the American Documentation Institute, October 6-11, 1963, Chicago, Illinois. The items of interest on the questionnaire were: attendance and use of time; general evaluations of meeting; preprinted short papers; evaluation of specific activities; and additional guidance for 1964. Attendance evaluative data and reports suggestions for the improvement of future meetings are presented. (Author)

AD-430 659 Div. 32
OTS price $1.10

Ohio State U., Columbus.
COUNSELING AS A PROCESS OF NEGOTIATION,
by Harold B. Pepinsky. 1960, 8p.
Contract AF49 638 373
AFOSR TN60 121 Unclassified report

Descriptors: (*Social sciences, Behavior), Sociology, Psychology, Personality, Social communication.

AD-430 814 Div. 32, 16
OTS price $2.50

Science and Tech. Div., Library of Congress, Washington, D. C.
BIBLIOGRAPHY OF BIOREGENERATING SYSTEMS FOR EXTRATERRESTRIAL HABITATION.
Rept. 15 Aug 62-15 Sep 63,
comp. and ed. by Paul E. Spiegler. Nov 63, 100p.
Contract AF33 657 62 397, Proj. 7164, Task 716405
AMRL TDR63 121 Unclassified report

Descriptors: (*Life support, Bibliographies), (*Extraterrestrial bases, Life support), (*Biology, Regeneration), Ecology, Physiology, Sanitary engineering, Food, Algae, Plants (Biology), Tissue (Biology), Laboratory animals, Moon, Space flight, Nutrition, Tissue culture, Test methods, Toxicity, Photosynthesis, Bacteria, Fungi, Space probes.

This bibliography is a representative sampling of the world's literature covering the years 1959 to the present concerning the various aspects of extraterrestrial habitation. The 440 references deal with both the physiology and ecology of bioregenerating systems for space travel and the specific human requirements for extraterrestrial habitation. The section on the biology of bioregenerating systems contains papers on waste management and re-utilization, gas exchange mechanisms using different plants, culture techniques for producing food by utilizing tissues or plants, edibility of algae and various animals, toxicological aspects of waste and materials of construction, and environmental conditions on the moon. Papers dealing with specific human requirements include those on nutrition, food technology, and various topics of personal hygiene and sanitation. (Author)

AD-431 014 Div. 32
OTS price $7.60

System Development Corp., Santa Monica, Calif.
EDP FOR RECLASSIFICATION AND TECHNICAL SERVICES IN THE LOS ANGELES STATE COLLEGE LIBRARY,
by Joel M. Kibbee. 4 Feb 64, 74p. Rept. no. TM1731 000 00
Unclassified report

Descriptors: (*Libraries, Classification), (*Libraries, Catalogs), (*Documentation, Classification), Text books, Catalogs, Costs, Analysis, Reviews, Data processing systems.

System Development Corporation, under contract with Los Angeles State College, undertook a joint study with the Library Staff to investigate: (1) utilizing EDP equipment for any of the clerical procedures necessitated by reclassification of books classified by the Dewey Decimal System; (2) utilizing any EDP procedures developed for reclassification in the handling of new acquisition; and (3) the possibility of converting from a card catalog to a book catalog. This was not a study of library automation, but was concerned with the implementation of the LC classification system. Book catalogs, Technical Services, and reclassification are discussed. (Author)

AD-431 057 Div. 32, 30
OTS price $2.60

System Development Corp., Santa Monica, Calif.
INDEX OF PUBLISHED PAPERS,
by C. G. Lambert and M. J. Nicholson. 24 Jan 64, 25p. Rept. no. SP0 001 00
Unclassified report

Descriptors: (*Indexes, Military publications), (*Reports, Indexes), Abstracts, Education, Computers, Behavior, Management engineering, Information retrieval, Psychology, Simulation, Learning.

This report supplements SP-0/000/02 and modifications A and B, and lists papers written by members of the professional staff of System Development Corporation while employed by the corporation. It lists only those papers written and published from July 1963 through 15 January 1964. DDC number assigned SP-0/002/02 is AD-420 513. (Author)

33. TRANSPORTATION

AD-429 906 Div. 33, 30
OTS price $9.10

National Aviation Facilities, Experimental Center, Atlantic City, N. J.
CONTROL LOAD, CONTROL CAPACITY AND OPTIMAL SECTOR DESIGN.
Interim rept.,
by Bar-Atid Arad, Benjamin T. Golden, James E. Grambart, Clifton E. Mayfield and H. Richard van Saun. Dec 63, 90p. Rept. no. RD64 16
Proj. 102 11R
NAFEC RD64 16 Unclassified report

Descriptors: (*Air traffic control systems, Operation research), Aviation safety, Area coverage, Flight paths, Models (Simulation), Mathematical analysis, Air traffic, Measurement, Scheduling, Correlation techniques, Reliability, Terminal flight Facilities, Optimization, Air traffic controllers, Distribution, Airspeed.

The complexity of total traffic phenomena in a controlled airspace is described by a model that relates the variables of the traffic (number of aircraft, distribution, speed), the rules of operation (separation minima) and the airspace (volume and flow organization) to the load which is imposed on the control position of the sector. Basic units of control load and control work are defined and used for quantification of the control effort required. The relationship between the load imposed on the control position and the geometry and the orientation of the sector is demonstrated and a method for optimizing the design of the sector is analyzed and described in a numerical example. The control capacity is quantified in units of control load and method of matching the size of the sector to the capacity for maximum efficiency of sector design is demonstrated and discussed. A paired comparison study is used to scale the amount of control work involved in handling the traffic in each of 20 control problems. (Author)

AD-430 087 Div. 33, 8, 1
OTS price $12.00

Arinc Research Corp., Washington, D. C.
ANALYSIS OF SAFETY ASPECTS OF AIRCRAFT LANDING OPERATIONS.
Final rept.,
by E. R. Jervis, J. R. Garafola, H. Dagen and F. B. Brady. Sep 63, 164p. Pub. no. 238 01 3 392
Contract FAA ARDS573, Proj. 11 4 3D
Unclassified report

Descriptors: (*Airplane landings, Safety), (*Aviation safety, Airplane landings), Civil aviation, Jet planes, Ground support equipment, Reliability, Reliability (Electronics), Flight instruments, Redundant components, All-weather aviation, Pilots, Landing aids, Instrument landings, Glide path systems, Electronic equipment, Ground controlled approach radar, Errors, Failure (Mechanics).

Equipment and operator failures were correlated with landing-operation safety in civil aircraft. To accomplish this objective, the various equipments used in present instrument landing systems in jet aircraft of two major airlines and ground equipments of five airports were analyzed for an estimate of their reliability and safety. From this estimate, figures of merit were determined for the various components of the systems; the figures of merit indicate the contribution to failure of the components or subsystems under various conditions, such as complete redundancy or single-series operation. They determine the effect of redundant elements on overall system reliability as well as on overall failure frequency. The estimates were also compared with similar estimates obtained on recently tested equipments that reflect the latest state of the art in highly reliable electronic equipments. On the basis of these comparisons, it is expected that if reliability requirements are included in the procurement specifications, the MTBF of landing equipments can be improved by a factor of at least 10 to 1 and as much as 60 to 1. (Author)

AD-430 108 Div. 33, 2, 30
OTS price $3.60

Federal Aviation Agency, Washington, D. C.
A STUDY OF THREE AREAS FOR A JETPORT TO SERVE METROPOLITAN NEW YORK. A REVIEW OF ENVIRONMENTAL FACTORS.
31 May 63, 30p.
Unclassified report

Original contains color plates: All DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Airports, Jet planes), (*Air traffic, Jet transport planes), Air traffic control systems, Feasibility studies, Simulation, Site selection, Display systems, Air traffic controllers, Aeronautical laboratories, Geography, Transportation, Civil aviation, Climatology, Terrain, Wind, Soils.

The Federal Aviation Agency has completed its survey of three proposed sites for a new jetport to serve the New York City metropolitan area. The sites are in Orange and Suffolk Counties, New York, and in Burlington County, New Jersey. Each is between one hour and thirty minutes and two hours traveltime from mid-Manhattan using currently existing railroad or highway facilities. The study concluded that any of the proposed jetport sites would create air traffic problems of some degree since their arrival and departure paths would cross routes required to serve other metropolitan airports or existing enroute airways. In addition, airspace requirements for handling traffic flow at any of the sites would necessitate changes to the boundaries of established warning and restricted areas as well as those of FAA air route traffic control centers and other control facilities. (Author)

AD-430 114 Div. 33, 1
OTS price $4.60

Federal Aviation Agency, Atlantic City, N. J
EVALUATION OF SIMPLIFIED APPROACH LIGHTING AIDS.
Final rept.,
by Thomas H. Paprocki. Nov 63, 44p.
Proj. 421 010 00V
Unclassified report

Descriptors: (*Approach lights, Effectiveness), (*Runways, Approach lights), Landing aids, Incandescent lamps, Rotation, Capacitors, Electric discharges, Beacon lights.

A study was made to determine the most effective, yet economical, system or combination of systems for use on other than precision approach runways. The following approach lighting aids were evaluated: (1) rotating incandescent runway end identifier lights, (2) condenser discharge runway end identifier lights, (3) rotating incandescent approach light beacons, (4) con-

denser discharge approach light beacons, Simplified approach lighting system, (6) shortened precision approach lighting system, and (7) wide beam circling guidance lights. The various systems were evaluated individually and in combination by flight testing under conditions of simulated and actual low visibilities. Pilot opinion and phototheodolite tracking data provided a basis for determing relative system effectiveness. Data obtained from an in-service evaluation of the rotating incandescent approach light beacons at New York International Airport were also considered in determing conclusions and recommendations. Recommendations were made for modification and adoption of the simplified approach lighting system as a standard for use on other than precision approach runways. (Author)

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NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterisk are listed in the subject index.

AGRICULTURE

TID-15840
Argonne National Lab., Ill.
RADIATION EFFECTS OF CARBON-14 AND TRITIUM ON GROWTH OF SOYBEAN
W. Chorney, N. J. Scully, and H. J. Dutton. Apr 62, 24p
Contract W31-109-eng-38
OTS $2.60

DESCRIPTORS: *Radiation effects, Plants (Botany).

ASTRONOMY

Astrophysics

N64-13066
Geophysics Corp. of America, Bedford, Mass.
A STUDY OF THE METEOROLOGY OF MARS AND VENUS Quarterly progress rept. no. 3, 6 Jul-5 Oct 63 [1963] 35p
Contract NASw-704
NASA CR-55165
OTS $3.60

NASA-TN-D-2110
Goddard Inst. for Space Studies, National Aeronautics and Space Administration, New York, N. Y.
DEPARTURES FROM LOCAL THERMODYNAMIC EQUILIBRIUM IN AN AO STAR ATMOSPHERE
Myron Lecar. Mar 64, 114p
N64-15971
OTS $2.50

NASA-TN-D-2111
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A DETECTOR-ANALYZER FOR STUDYING THE INTERPLANETARY PLASMA
K. W. Ogilvie, N. McIlwraith, H. J. Zwally, and T. D. Wilkerson (Maryland Univ.). Feb 64, 15p
N64-14727
OTS $0.50

NASA-TN-D-2097
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SYNCHROTRON RADIATION CALCULATIONS FOR THE ARTIFICIAL RADIATION BELT
M. P. Nakada. Jan 64, 16p
N64-16117
OTS $0.50

N64-15182
Institute of Geophysics and Planetary Physics, Univ. of California, Los Angeles
NOTES FOR THE SUMMER INSTITUTE IN PLANETARY PHYSICS. APPENDIX VI
Gordon J. F. MacDonald. 1963, 361p
Grant NsG-429
NASA CR-55384; includes N64-15183-15185
OTS $21.00

N64-13058
Iowa State Univ., Iowa City.
HIGH-LATITUDE GEOPHYSICAL STUDIES WITH SATELLITE INJUN III. PART IV: AURORAS AND THEIR EXCITATION
B. J. O'Brien (Rice Univ.) and H. Taylor. [1963] 69p
Grant NsG-233-62; Contract N9onr-938(03)
SUI-63-32; NASA CR-55159
OTS $6.60

BIOLOGICAL SCIENCES

NAS-NRC-1138
Committee on Toxicology, NAS-NRC, Washington, D.C.
PRINCIPLES AND PROCEDURES FOR EVALUATING TOXICITY OF HOUSEHOLD SUBSTANCES
Arnold J. Lehman, David W. Fassett, Horace W. Gerarde, Herbert E. Stokinger, and John W. Zapp
1964, 35p
NAS-NRC $1.50

DESCRIPTORS: *Chemicals, Toxicity, Test methods, Laboratory animals, *Toxic tolerances, Standards,

Topics include: oral ingestion; evaluation of the aspiration hazards of liquids; percutaneous absorption, eye and skin irritation and sensitization; inhalation; regulations under the Federal Hazardous Substances Labeling Act.

TID-18714
Harvard Univ., Cambridge, Mass.
BIOLOGICAL RESEARCH. Progress rept. for 1 Jan-31 Dec 62.
A. K. Solomon. 17 May 63, 9p
Contract AT(30-1)2453
OTS $1.10

N64-15181
National Research Corp., Cambridge, Mass.
EFFECTS OF SIMULATED SPACE ENVIRONMENTS ON THE VIABILITY OF MICROORGANISMS. Final rept., 15 Apr 61-30 Apr 63
Gerald J. Silverman, Norman S. Davis, Cecil G. Dunn, Rosario P. Giammanco, and Frank C. Benner, 18 Dec 63, 34p
Contract NASr-41
NASA-CR-55288
OTS $3.60

PB-165 181
Naval School of Aviation Medicine, Pensacola, Fla.
AUTOMATIC ECONOMIC NITROGEN ELIMINATION IN OXYGEN REBREATHING SYSTEMS
Roscoe G. Bartlett, Jr. and Rita A. Hertz. 19 Feb 62, 9p
Proj. MR005.13-3100, rept. no. 10
OTS $1.10

DESCRIPTORS: *Nitrogen, *Oxygen, *Respiration, Oxygen equipment, *Breathing apparatus.

Economic, automatic nitrogen elimination from the body is a necessary adjunct to an acceptable oxygen rebreather system. A new approach to nitrogen elimination has been developed. Economic, periodic nitrogen purging is accomplished with normal breathing and without any manual manipulation or attention by the aviator during the elimination schedule. The purging schedule makes possible the design of a completely automatic self-purging oxygen rebreathing system. (Author) (See also AD 275 970)

PB-165 182
Naval School of Aviation Medicine, Pensacola, Fla.
IS IT POSSIBLE TO DIFFERENTIATE BY INHALATION BETWEEN AIR AND OXYGEN?
Roscoe G. Bartlett, Jr. and Rita A. Hertz. 11 Jul 61, 9p
Proj. MR005.13-3100, rept. no. 1
OTS $1.10

DESCRIPTORS: *Air, *Oxygen, Respiration, Smell, Determination, Thresholds (Physiology),

Normal subjects were tested for their ability to differentiate between oxygen and air by inhalation. The ability to designate air and oxygen was also investigated. There was no evidence that the subjects could either differentiate or designate. In the absence of the ability to differentiate, it seems that one might well question the claims by normal individuals of beneficial effects of oxygen inhalation. (Author)

AD-286 994
Oregon State Univ., Corvallis. Agricultural Experiment Station.
THE GROWTH, BREEDING, LONGEVITY AND HISTOPATHOLOGY OF RATS FED IRRADIATED OR CONTROL FOODS (HISTOPATHOLOGICAL STUDIES).
Semiannual rept. no. 3
J. F. Bone. 3 Jul 62, 4p
Contract DA49-193-MD-2064
NP-12086
OTS $1.10

DESCRIPTORS: *Radiation effects, *Food, Rats, Laboratory animals, Histology, Respiratory system, Urinary system, Reproductive system, Nervous system, Digestive system, Circulatory system, Endocrine glands, Tumors, Eyes, Brain, Ear, Life span, Pathology, Tissues (Biology).

There is no appreciable difference in the pathology encountered in the controls and the experimental (irradiated) animals. Gross and microscopic examinations of control and experimental animals have not revealed any lesions which could be attributed to the test foods. Descriptions of outstanding lesions encountered in the course of this experiment are included in this report. (Author)

TID-19003
Amherst Coll., Mass.
GENETIC AND DIRECT EFFECTS OF γ RADIATION ON DROSOPHILA. Progress rept. for 1962 [1962] 10p
Contract AT(30-1)2467
OTS $1.10

DESCRIPTORS: *Radiation effects, Genetics, Mutations, *Drosophilidae.

TID-17820
Argonne National Lab., Ill.
NATURAL AIRBRONE RADIOACTIVITY RaD (Pb^{210}) AND RaF (Po^{210}) IN THE HUMAN BODY
Richard B. Holtzman. Nov 62, 14p
UAC-7046
OTS $1.60

DESCRIPTORS: *Natural radioactivity, Radium, Lead, Polonium, Isotopes.

TID-16249
Argonne National Lab., Ill.
POSSIBLE ROLE OF CATALASE IN RADATION EFFECTS ON MAMMALS
John F. Thomson. May 62, 25p
Contract W31-109-eng-38
UAC-6452
OTS $2.60

DESCRIPTORS: *Radiation effects, *Catalase, *Mammals

TID-17819
Argonne National Lab., Ill.
RaD (Pb^{210}) IN THE HUMAN SKELETON. ESTIMATES OF THE EXPONENT OF THE RETENTION FUNCTION, THE SKELETAL CONTENT AND THE DOSE RATE IN RADIUM BURDENED PEOPLE.
Richard B. Holtzman. Nov 62, 9p
Contract W31-109-eng-38
OTS $1.10

DESCRIPTORS: Lead, *Bone, Radium, Isotopes.

ACRH-20
Argonne Cancer Research Hospital, Chicago, Ill.
SEMIANNUAL REPORT TO THE ATOMIC ENERGY COMMISSION
Leon O. Jacobson and Margot Doyle, ed. Sep 63, 147p
Contract AT(11-1)69
OTS $2.50

TID-15850
Argonne National Lab., Ill.
THYMIC LYMPHOMA INCIDENCE AND LONGEVITY OF FEMALE MICE IRRADIATED WITH EITHER FISSION NEUTRONS OR CO^{60} γ-RAYS AT DIFFERENT DOSE RATES
Howard H. Vogel, Jr. and Donn L. Jordan. Apr 62, 13p
Contract W31-109-eng-38
UAC-6296
OTS $1.60

DESCRIPTORS: *Life span, *Radiation effects, *Leukemia,

TID-19655
Connecticut Univ., Storrs.
COMPARATIVE STUDIES OF THE EFFECTS OF X-RADIATION ON MAMMALS AND PROTOZOA.
Progress rept., 1 Nov 62-1 Sep 63.
Jay S. Roth. [1963] 35p
Contract AT(30-1)2737
OTS $3.60

AD-287 011
Illinois Univ., Urbana
ON THE NUTRITIVE VALUE OF THE MAJOR NUTRIENTS OF IRRADIATED FOODS AND APPRAISAL OF THE TOXICITY OF IRRADIATED FOODS. Progress rept. no. 21, 1 Sep 61-1 Mar 62, 30p
P. B. Rama Rao, A. M. Paolucci, Sancia Gaetani, H. E. Schendel, and Roberta Hill. [1962] 30p
Contract DA49-007-MD-544
NP-12093
OTS $2.60

DESCRIPTORS: *Food, *Radiation effects, *Vitamin K, *Proteins, Nutrition, Laboratory animals, Primates, Deficiency diseases, Anemia, Toxicity, Synthesis.

Contents:
Vitamin K deficiency in the baby pig
Vitamin K and protein synthesis
Studies of vitamin K in the Macaca Mulatta monkey

TID-17840
Institute for Cancer Research, Philadelphia, Pa.
STUDIES OF THE EFFECTS OF ULTRAVIOLET RADIATION ON CELL STRUCTURE AND BEHAVIOR.
Annual rept. Dec 61-Dec 62.
Jerome J. Freed and James L. Engle
OTS $2.60

DESCRIPTORS: Microscopy, *Ultraviolet radiation.

TID-18949
Michigan Univ., Ann Arbor.
BIOLOGICAL AND PSYCHOLOGICAL EFFECTS OF RADIATION IN THE PLANARIAN. Technical rept. no. 1, [1962], 22p
Contract AT(11-1)825, TR-1
OTS $2.60

DESCRIPTORS: *Platyhelminths, X-rays, *Radiation effects.

TID-18979
Turku Univ. (Finland).
MUTATION RATES AT SPECIFIC AUTOSOMAL LOCI IN DIFFERENT SPECIES OF DROSOPHILA.
Semi-annual rept.
Aloha Hannah-Alava. [1963] 9p
Contract IAEA 31/US and Contract AT(30-1)2690
OTS $1.10

DESCRIPTORS: *Mutations, Genetics, *Drosophilidae.

Zoology

HW-SA-2576
Hanford Atomic Products Operation, Richland, Wash.
BEGINNING OF REPRODUCTION DETERMINED BY AGE OF THE FEMALE FLOUR BEETLE, TRIBOLIUM CONFUSUM (COLEOPTERA: TENEBRIONIDAE)
H. E. Erdman. 25 May 62, 5p
Contract AT(45-1)1350
OTS $1.10

DESCRIPTORS: *Coleoptera, *Insects, Reproduction,

TID-19136
Savannah River [Lab.] Aiken, S. C.
INSECT SPECIES IN THE HERB STRATUM OF A SERICEA LESPEDEZA STAND, AEC SAVANNAH RIVER PROJECT, AIKEN SOUTH CAROLINA
Edward F. Menhinick. 15 Oct 63, 48p
Contract AT(38-1)310
OTS $1.25

CHEMISTRY

IS-777
Ames Lab., Iowa State Univ. of Science and Tech.
EXTRACTION OF URANIUM, THORIUM, HAFNIUM AND THE ALKALINE EARTH ELEMENTS WITH BIS(DI-n-HEXYLPHOSPHINYL)METHANE FROM PERCHLORIC ACID SOLUTIONS, PART I. SIMULTANEOUS SPECTROPHOTOMETRIC DETERMINATION OF TRACE AMOUNTS OF CALCIUM AND MAGNESIUM WITH CHLOROPHOSPHONAZO III, PART II.
Jerry Walter Ferguson and Charles Banks. Nov 63, 42p
Contract W7405-eng-82
OTS $1.00

IS-508
Ames Lab., Iowa State Univ. of Science and Tech.
CATION EXCHANGE SEPARATION OF DIVALENT METAL IONS FROM RARE EARTHS
James S. Fritz and Barbara B. Carralda. 27 Jul 62, 10p
Contract W7405-eng-82
OTS $1.10

DESCRIPTORS: *Rare earths, *Ion exchange.

IS-727
Ames Lab., Iowa State Univ. of Science and Tech.
FORMATION CONSTANTS OF SOME RARE-EARTH COMPLEXES
William Ray Stagg and Jack E. Powell. Aug 63, 91p
Contract W7405-eng-82
OTS $2.00

IS-728
Ames Lab., Iowa State Univ. of Science and Tech.
AN INFRARED STUDY OF THE TRIBUTYL PROSPHATE-NITRIC ACID-WATER SOLVENT EXTRACTION SYSTEM
Patrick John Kinney and Morton Smutz. Aug 63, 165p
Contract W7405-eng-82
OTS $2.75

IS-737
Ames Lab., Iowa State Univ. of Science and Tech.
SEPARATION OF VARIOUS CATIONS BY REVERSED-PHASE PARTITION CHROMATOGRAPHY USING NEUTRAL ORGANOPHOSPHORUS COMPOUNDS
Jerome W. O'Laughlin and Charles V. Banks. May 63, 144p
Contract W7405-eng-82
OTS $2.50

IS-790
Ames Lab., Iowa State Univ. of Science and Tech.
VAPOR PRESSURES OF SOME AMINO ACIDS
Dale Dean Clyde and Harry Svec. Nov 63, 35p
Contract W7405-eng-82
OTS $1.00

ANL-6803
Argonne National Lab., Ill.
COMPOUNDS IN THE BINARY PHASE DIAGRAMS OF THE MONOVALENT CHLORIDES WITH THE MULTIVALENT CHLORIDES
R. Gut, E. Iberson, and D. M. Gruen. Nov 63, 21p
Contract W31-109-eng-38
OTS $0.50

TID-15762
Argonne National Lab., Ill.
THE REACTION OF GRAPHITE WITH NITROGEN AND OTHER PERTINENT THERMODYNAMIC SYSTEMS STUDIED WITH A MASS SPECTROMETER
J. Berkowitz. Mar 62, 21p
Contract W31-109-eng-38
UAC-6215
OTS $2.60

DESCRIPTORS: *Graphite, *Nitrogen, *Thermodynamics.

TID-17842
Argonne National Lab., Ill.
SEPARATION OF GASEOUS MIXTURES OF URANIUM HEXAFLUORIDE AND PLUTONIUM HEXAFLUORIDE BY THERMAL DECOMPOSITION
L. Trevorrow, J. Fischer, and J. Riha. Oct 62, 18p
Contract W31-109-eng-38
UAC-7037
OTS $1.60

DESCRIPTORS: *Plutonium, *Uranium, *Fluorides, Separation,

TID-15770
Argonne National Lab., Ill.
VAPOR-LIQUID EQUILIBRIUM IN THE SYSTEM BROMINE PENTAFLUORIDE-URANIUM HEXAFLUORIDE
Robert C. Liimatainen and Bernet S. Swanson (Illinois Inst. of Technology). 12 Mar 62, 21p
Contract W31-109-eng-38
UAC-6227
OTS $2.60

DESCRIPTORS: *Bromine, *Uranium, *Fluorides, Vapor pressure

PB-165 139
Cryogenic Lab., Ohio State Univ. Research Foundation, Columbus.
THE VAPOR PRESSURE OF INORGANIC SUBSTANCES V. ZIRCONIUM BETWEEN 1949° AND 2054°K. Technical rept. no. 7
Gordon B. Skinner, James W. Edwards, and Herrick L. Johnston. 27 Jul 50, 16p
Contract N6onr-225, T.O. I
TR 281-7; ATI-94 876
OTS $1.60

DESCRIPTORS: *Zirconium compounds, Oxides, *Vapor pressure, Inorganic compounds, Thermodynamics

The vapor pressure of zirconium was determined in the temperature range 1949° to 2054°K by measuring the rate at which a zirconium surface evaporates into a vacuum. Values of ΔH_o^o were calculated from the individual vapor pressures and showed no appreciable trend, the average value being 142,150 ± 350 cal/mol. By combining this value with free energy functions of gaseous zirconium and with extrapolated values for the solid, the following equation for vapor pressure was obtained.

$$\log P\,(\text{atm}) = -\frac{31,066}{T} 7.3351 - 2.415 \times 10^{-4} T$$

(Author)

DRI-2059
Denver Research Inst., Colo.
INVESTIGATION OF HYDRIDING CHARACTERISTICS OF INTERMETALLIC COMPOUNDS. Summary rept. for 1 Nov 60-31 Sep 62.
Richard L. Beck. 15 Oct 62, 63p
Contracts AT(33-3)3 and AT(11-1)1092
OTS $6.60

DESCRIPTORS: *Intermetallic compounds, Hydrogen, Hydrides.

HW-SA-2596
Hanford Atomic Products Operation, Richland, Wash.
ANION EXCHANGE AND NON-AQUEOUS STUDIES OF THE ANIONIC CHLORO COMPLEXES OF THE HEXAVALENT ACTINIDES
J. L. Ryan. 14 Jun 62, 34p
Contract AT(45-1)1350
OTS $3.60

DESCRIPTORS: *Actinides, *Chlorides, *Complex compounds, Ion exchange resins,

HW-79296
Hanford Atomic Products Operation, Richland, Wash.
CONTINUOUS MEASUREMENTS OF TRACE CONCENTRATIONS OF AMMONIA IN WATER
T. F. Demmitt. Oct 63, 11p
Contract AT(45-1)1350
OTS $0.50

HW-53368 (Suppl. 1)
Hanford Atomic Products Operation, Richland, Wash.
PLUTONIUM OXIDATION-REDUCTION TITRATIONS
R. J. Kofoed, Jr. Dec 63, 29p
Contract AT(45-1)1350
OTS $0.75

IS-499
Institute for Atomic Research, Iowa State Univ. of Science and Tech., Ames
THE HYDROLYSIS OF THE RARE-EARTH CARBIDES
Harry J. Svec, Jennings Capellen, and Fred E. Saalfeld. 16 Jul 62, 17p
Contract W7405-eng-82
OTS $1.60

DESCRIPTORS: *Rare earths, *Carbides, *Hydrolysis,

IS-487
Institute for Atomic Research, Iowa State Univ. of Science and Tech., Ames
THE PREPARATION AND PROPERTIES OF MOLYBDENUM(IV) BROMIDE
P. J. H. Carnell and R. E. McCarley. 12 Jul 62, 15p
Contract W7405-eng-82
OTS $1.60

DESCRIPTORS: *Molybdenum, *Bromides,

TID-16284
Kansas Univ., Lawrence.
ANODIC VOLTAMMETRY AND ELECTRON PARAMAGNETIC RESONANCE STUDIES OF ISOMERIC PHENYLENEDIAMINES
H. Y. Lee and Ralph N. Adams. 19 Jul 62, 11p
Contract AT(11-1)686
OTS $1.60

DESCRIPTORS: *Electrochemistry, Electrons, *Paramagnetic resonance

UCRL-10197
Lawrence Radiation Lab., Univ. of California, Berkeley.
CRYSTAL STRUCTURE OF KH_2F_3 AND GEOMETRY OF THE $H_2F_3^-$ ION
J. D. Forrester, Michael E. Senko, Allan Zalkin, and David H. Templeton. 30 Apr 62, 15p
Contract W7405-eng-48
OTS $1.60

DESCRIPTORS: *Potassium, *Fluorides, *Crystal structure,

UCRL-10971
Lawrence Radiation Lab., Univ. of California, Berkeley.
A SOLVENT EXTRACTION STUDY OF PROTON SOLVATION
Teresa Jean Conocchioli. Master's thesis. 4 Sep 63, 76p
Contract W7405-eng-48
OTS $2.00

LADC-5791

Los Alamos Scientific Lab., N. Mex.
TRANSPORT PROPERTIES OF He^3, He^4, H_2, D_2, T_2, AND Ne IN THE LIQUID STATE ACCORDING TO THE QUANTUM MECHANICAL PRINCIPLE OF CORRESPONDING STATES
J. F. Kerrisk, J. D. Rogers, and E. F. Hammel. [1963] 21p
Contract W7405-eng-36
OTS $2.60

DESCRIPTORS: *Thermal conductivity, Deuterium, Tritium, *Helium group gases, Liquefied gases, Transport properties.

TID-18959
Maine Univ., Orono.
ELECTROLYTIC SOLUTIONS. Annual Progress Rept. for 1 May 62-1 Jun 63
Jerry Braunstein. 1 Jun 63, 22p
Contract AT(30-1)2873
OTS $2.60

DESCRIPTORS: *Electrolytes.

TID-18995
Monsanto Research Corp., Dayton, Ohio.
PHYSICAL PROPERTIES OF POLYPHENYLS
W. H. Hedley, M. V. Milnes, and W. H. Yanko. [1962] 21p
Contracts AT(11-1)705 and AT(10-1)1088
OTS $2.60

DESCRIPTORS: *Reactor coolants, Heat transfer

K-1400
Oak Ridge Gaseous Diffusion Plant, Tenn.
ISOTOPIC RATIO MEASUREMENT ERRORS CAUSED BY ION INTERACTIONS WITH IMPURITY MOLECULES
V. L. Warren and J. C. Horton. 14 Feb 64, 21p
Contract W7405-eng-26
OTS $0.50

ORNL-TM-625
Oak Ridge National Lab., Tenn.
SYNTHESIS OF o-NITROPHENYLARSONIC ACID, o-AMINOPHENYLARSONIC ACID AND ARSENAZO III.
H. L. Holsopple. 12 Jul 63, 6p
Contract W7405-eng-26
OTS $1.10

DESCRIPTORS: *Arsonic acids

TID-19012
Princeton Univ., N. J.
THE COPRECIPITATION OF Sr^{+2} WITH CALCITE BETWEEN 90° AND 100°C
H. J. Holland and J. L. Munoz. 22 Jul 63, 35p
Contract AT(30-1)2266
OTS $3.60

DESCRIPTORS: *Calcite, *Strontium,

NYO-6553
Rensselaer Polytechnic Inst., Troy, N. Y.
EXTRACTION OF INORGANIC SUBSTANCES BY ORGANIC SOLVENTS. Progress rept. for 1 Jul 56-1 Jun 57
Herbert M. Clark. 1 Jun 57, 12p
Contract AT(30-1)1663
OTS $1.60

DESCRIPTORS: *Aluminum, *Chlorides, *Solvent extraction, *Organic solvents.

NYO-6555
Rensselaer Polytechnic Inst., Troy, N. Y.
EXTRACTION OF INORGANIC SUBSTANCES BY ORGANIC SOLVENTS. Progress rept. for 1 Jun 57-31 May 58
Herbert M. Clark. 2 Jun 58, 22p
Contract AT(30-1)1663
OTS $2.60

DESCRIPTORS: *Aluminum, *Chlorides, *Solvent extraction, *Organic solvents.

UNC-5000
United Nuclear Corp., White Plains, N. Y.
DEVELOPMENT OF A CONTINUOUS METER FOR OXYGEN IN SODIUM. Quarterly progress rept. 1 Sep-1 Dec 61.
H. Steinmetz. 15 Jan 62, 16p
Contract AT(30-1)2877
OTS $1.60

DESCRIPTORS: *Oxygen, *Sodium.

UNC-5032
United Nuclear Corp., White Plains, N. Y.
DEVELOPMENT OF A CONTINUOUS METER FOR OXYGEN IN SODIUM. Final rept. for 1 Sep 61-31 Jul 62.
H. Steinmetz. 24 Aug 62, 35p
Contract AT(30-1)2877
OTS $3.60

DESCRIPTORS: *Oxygen, *Sodium, *Electrochemistry

UNC-5010
United Nuclear Corp., White Plains, N. Y.
DEVELOPMENT OF A CONTINUOUS METER FOR OXYGEN IN SODIUM. Quarterly progress rept. 1 Dec 61-28 Feb 62.
H. Steinmetz. 15 Apr 62, 15p
Contract AT(30-1)2877
OTS $1.60

DESCRIPTORS: *Sodium, *Oxygen.

NYO-6550
Walker Lab., Rensselaer Polytechnic Inst., Troy, N. Y.
EXTRACTION OF INORGANIC SUBSTNACES BY ORGANIC SOLVENTS. Progress rept. for 1 Nov 53-1 Jul 54.
D. E. Byrnes, A. J. Hogan, and H. M. Clark. 15 Jul 54, 6p
Contract AT(30-1)1663
OTS $1.10

DESCRIPTORS: *Aluminum, *Chlorides, *Solvent extraction, *Organic solvents.

NYO-6551
Walker Lab., Rensselaer Polytechnic Inst., Troy, N. Y.
EXTRACTION OF INORGANIC SUBSTANCES BY ORGANIC SOLVENTS. Progress rept. for 1 Nov 54-1 Jul 55
H. M. Clark. 15 Jul 55, 11p
Contract AT(30-1)1663
OTS $1.60

DESCRIPTORS: *Aluminum, *Chlorides, *Solvent extraction, *Organic solvents.

NYO-6552
Walker Lab., Rensselaer Polytechnic Inst., Troy, N. Y.
EXTRACTION OF INORGANIC SUBSTANCES BY ORGANIC SOLVENTS. Progress rept. for 1 Jul 55-1 Jul 56
H. M. Clark. 15 Jul 55, 12p
Contract AT(30-1)1663
OTS $1.60

DESCRIPTORS: *Aluminum, *Chlorides, *Solvent extraction, *Organic solvents.

Physical Chemistry

NASA-TN-D-2131
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
CHEMICAL RELAXATION BEHIND STRONG SHOCK WAVES IN CARBON DIOXIDE INCLUDING INTER-DEPENDENT DISSOCIATION AND IONIZATION PROCESS
John T. Howe and Yvonne S. Sheaffer. Feb 64, 54p
N64-15221
OTS $1.50

TID-16286
Kansas Univ., Lawrence.
TRIANGULAR WAVE CYCLIC VOLTAMMETRY
Z. Galus, H. Y. Lee, and Ralph N. Adams.
19 Jul 62, 16p
Contract AT(11-1)686
OTS $1.60

DESCRIPTORS: *Electrodes, Electrochemistry.

NASA-TN-D-2087
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
EFFECT OF AMBIENT AIR VELOCITY ON ATOMIZATION OF TWO IMPINGING WATER JETS
David A. Bittker. Feb 64, 36p
N64-15219
OTS $1.00

EARTH SCIENCES

NAS-NRC-1096
Foreign Field Research Program, NAS-NRC, Washington, D. C.
PATTERNS OF SETTLEMENT AND SUBSISTENCE IN SOUTHWESTERN ANGOLA. Rept. for Oct 58-Nov 59
Alvin W. Urquhart. 1963, 162p
Contract Nonr-2300(09)
Rept. no. 18
NAS-NRC $4.00

DESCRIPTORS: *Geography, *Angola, Buildings, Sociology, Agriculture, Economics, Population.

This study presents the findings of a year of field work in Portugal and Angola. The author attempts to describe and explain the patterns of settlement and subsistence of the farmer-herders and neighboring African peoples who live on the Huila Plateau of southwestern Angola. A historical background of the occupation and colonization of this area by Europeans supplements this study. (Author)

NASA-TN-D-2109
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
THE WORLD MAGNETIC SURVEY
James P. Heppner. Jan 64, 45p
N64-14984
OTS $1.25

NASA-TN-D-2041
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN ANALYTICAL STUDY OF THE MAGNETIC FIELD ENCOUNTERED BY ARTIFICIAL EARTH SATELLITES IN CIRCULAR ORBITS
Ward F. Hodge and W. Thomas Blackshear. Feb 64, 49p
N64-15218
OTS $1.25

PB-163 734
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
ICE PHOTOGRAPHY FROM THE METEOROLOGICAL SATELLITES TIROS I AND TIROS II
D. Q. Wark and R. W. Popham. Mar 62, 49p
Rept. no. 8
OTS $4.60

DESCRIPTORS: *Meteorological satellites, *Aerial photography, *Ice, *Photographic reconnaissance,

The Meteorological Satellite Laboratory of the U. S. Weather Bureau and the U. S. Navy Hydrographic Office. with support from the National Aeronautics and Space Administration and the Commander Barrier Forces Atlantic, have cooperated on a program to determine to what extent Tiros meteorological satellite photographs can be used for ice surveillance and to lay a foundation for further Tiros and Nimbus satellite ice surveillance studies. The report summarizes the observational program, presents the results graphically, and discusses analytically a limited portion of the material. (Author)

Climatology and Meteorology

NASA-TN-D-1910
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
AN ANALYSIS OF TIROS II RADIATION DATA RECORDED OVER NEW ZEALAND AT NIGHT
Lewis J. Allison. Mar 64, 21p
N64-15970
OTS $0.75

NASA-TN-D-2136
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A GEOGRAPHICAL GRID FOR NIMBUS CLOUD PICTURES
Eugene M. Darling, Jr. Feb 64, 17p
N64-15846
OTS $0.50

PB-163 741
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
CALIBRATION OF IMAGE DISTORTION IN TIROS WIDE ANGLE PHOTOGRAPHY
Russell C. Doolittle. Jul 63, 56p
Rept. no. 15
OTS $5.60

DESCRIPTORS: *Meteorological satellites, *Satellites (Artificial), Wide-field cameras, *Photographic images, Distortion, Calibration.

The field calibration procedure is outlined. The computation of principal distance and image distortions are described in detail, and results for the wide angle cameras in TIROS I through VI are summarized. (Author)

PB-163 738
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
CATALOG OF SUPPLEMENTAL METEOROLOGICAL DATA CONCURRENT WITH TIROS SATELLITE OBSERVATIONS, TIROS I, II, III, IV, V
Robert L. Pyle. Aug 62, 41p
Rept. no. 12
OTS $4.60

DESCRIPTORS: *Meteorological satellites, *Satellites (Artificial), Meteorological parameters, *Catalogs, Weather forecasting,

Special meteorological data obtained in support of the first five TIROS satellite operations are listed and described. Procedures are given for obtaining copies of these and of routine meteorological data for use in research studies of the TIROS observations. (Author)

PB-163 727
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
CLOUD CONFERENCE SUMMARY
Linwood F. Whitney, Jr., ed. Jul 60, 26p
MSL rept. no. 1
OTS $2.60

DESCRIPTORS: *Conferences, *Clouds, Scientific research, Reports, Meteorology.

In order to determine the present state of cloud research, leading authorities in the United States were invited to a Cloud Conference on 14-15 Dec. 1959 at Washington, D. C. This report is intended as a summary of the presentations made at this meeting. No attempt was made to render a verbatim transcription of the remarks made by each participant. Rather, the attempt has been to present a summary of each speakers remarks, and to present the highlights of the various discussion periods. (Author)

PB-163 746
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
CONFERENCE ON SATELLITE ICE STUDIES
Maurice D. Baliles and Herbert Neiss, ed. Jun 63, 106p
Rept. no. 20
OTS $9.10

DESCRIPTORS: *Conferences, *Meteorological satellites, *Ice-formation indicators, Weather forecasting, Ice, Reports.

This report presents the transcript of the Conference on Satellite Ice Studies held June 14, 1962, in Washington, D. C. Representatives from the fields of meteorology, oceanography, hydrology, geology, and photogrammetry were invited to discuss and review the satellite photography collected in conjunction with Project TIREC and to present their thoughts and ideas on the use of satellite observations for ice reconnaissance. These transactions are being distributed with the view of stimulating interest in satellite observations which might also be useful in associated fields. (Author)

PB-163 735
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
DOCUMENTATION FOR TIROS III TELEVISION DATA
Lester F. Hubert, Mar 62, 68p
Rept. no. 9
OTS $6.60

DESCRIPTORS: *Meteorological satellites, *Satellites (Artificial), Television equipment, *Telemetering data, Pictures, Documentation, Position finding,

Three-dimensional location of the TIROS III meteorological satellite at minute intervals for picture sequences, the camera orientation vector, and image principal point location are presented for use in gridding and analysis of television data. Usable quality pictures were obtained for 100 days of operation and documentation is given for that period. (Author)

PB-163 742
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
DOCUMENTATION FOR TIROS IV TELEVISION DATA
Robert L. Pyle. May 63, 88p
Rept. no. 16
OTS $8.10

DESCRIPTORS: *Meteorological satellites, *Satellites (Artificial), Television equipment, *Telemetering data, Pictures, Documentation, Mapping, Photogrammetry.

Effective use of television pictures from the TIROS IV meteorological satellites requires knowledge of the geographical location of image features to an accuracy that, for most purposes, should be the best that can possibly be attained. Photogrammetric techniques must be employed to calculate the proper placement and orientation of a picture on a map of the earth. The purpose of this report is to provide in convenient form the data required to use these techniques for mapping TIROS IV data. (Author)

PB-163 206
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
INFRARED FLUX AND SURFACE TEMPERATURE DETERMINATIONS FROM TIROS RADIOMETER MEASUREMENTS
D. Q. Wark, G. Yamamoto, and J. Lienesch. Apr 63, 10p
Rept. no. 10, supplement; N63-17446
OTS $1.10

DESCRIPTORS: *Meteorological satellites, *Satellites (Artificial), *Infrared radiation, Measurement, *Radiometers, Thermistors,

Changes in M.S.L. Report No. 10 are required because of the results from recent tests on the spectral emissivity of thermistor detectors, and because of some small errors in the computation of spectral intensities for model atmospheres. The spectral emissivity of the thermistor detectors of the TIROS radiometers is presented; these data are included in new filter transmission values for TIROS III and IV. Small changes and corrections were introduced into the computer program to produce new intensity values for the 106 model atmospheres. Corrected constants and additional empirical equations for the determination of radiative flux and surface temperature are given. (Author)

PB-163 737
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
PERSPECTIVE LOCATOR GRIDS FOR TIROS PICTURES
Morris Frankel and Charles L. Bristor. Oct 62, 45p
Rept. no. 11; N63-17579
OTS $4.60

DESCRIPTORS: *Meteorological satellites, *Satellites (Artificial), *Telemetering data, Photographs, Pictures, *Position finding,

Computer activities in satellite meteorology within the Weather Bureau began during the latter part of 1958 at which time the task of geographically locating features of interest in photos obtained by rockets and satellites was undertaken. The present purpose is to document these efforts - first discussing early digital rectification studies on the IBM 704 and then describing, in some detail, the current perspective geographical locator grid programs produced by the Meteorological Satellite Laboratory for TIROS. (Author)

SCTM-68-63(72)
Sandia Corp., Albuquerque, N. Mex.
CLIMATOLOGY OF TONOPAH TEST RANGE, 1962
J. R. Schaeffer. Mar 63, 26p
Contract AT(29-1)789
OTS $2.60

Geology

GPO-I-19.3:1141-D
Geological Survey, Washington, D. C.
GENERAL GEOLOGY OF THE JACKSON MOUNTAINS, HUMBOLDT COUNTY, NEVADA. CONTRIBUTIONS TO GENERAL GEOLOGY
Ronald Willden. 1963, 72p
Geological Survey bulletin 1141-D
GPO $1.00

DESCRIPTORS: *Geological survey, *Nevada, *Mountains, *Petrology, Structural geology, Economic geology, Geology.

The Jackson Mountains in Humboldt County, Nev., are interesting for several reasons. The chief reason is the presence of Cretaceous rocks in the range, one of only three areas known in Nevada where Cretaceous rocks record the late Mesozoic and early Tertiary orogenic history of the region. A second reason is that some of the intrusive rocks appear to have had their composition controlled to some degree by Permian or older volcanic rocks, which are the predominant pre-intrusive country rocks. The range also contains workable iron and quicksilver deposits. This report is based on field work in 1956 and additional work in 1957 and 1958. (Author)

GPO-I-19.16:425
Geological Survey, Washington, D. C.
GEOCHEMISTRY AND PETROLOGY OF THE ALKALIC IGNEOUS COMPLEX AT MAGNET COVE, ARKANSAS
R. L. Erickson and L. V. Blade. 1963, 103p
Geological Survey Professional Paper 425
GPO $1.50

DESCRIPTORS: *Geological survey, *Arkansas, *Geochemistry, *Petrology, *Igneous rock, Economic geology, Minerals, Structural geology, Geology.

Rocks were analyzed chemically and spectrographically; some of the minerals separated from the analyzed rocks were chemically analyzed, and all were spectrographically analyzed. Chemically the igneous rocks are high volatile, high lime, alkalic and subsilicic; they include intrusive carbonatite masses as well as the iron, titanium, zirconium, and phosphate minerals that characterize similar alkalic rocks throughout the world. High niobium substitution in titanium minerals and rare-earth substitution in apatite and perovskite are also typical. Significant quantities of niobium in the igneous rocks and in the associated titanium deposits are concentrated in rutile, brookite, perovskite, sphene, garnet, aegirine, and hornblende. (Author)

GPO-I-19.13:1613-A
Geological Survey, Washington, D. C.
GEOLOGY AND GROUND-WATER CONDITIONS IN SOUTHERN NASSAU AND SOUTHEASTERN QUEENS COUNTIES, LONG ISLAND, N. Y. RELATION OF SALT WATER TO FRESH GROUND WATER
N. M. Perlmutter and J. J. Geraghty. 1963, 218p
Geological Survey Water-Supply paper 1613-A
GPO $1.50

DESCRIPTORS: *Geological survey, *Ground waters, *Hydrology, *New York, *Water supplies, Sea water, Salinity, Geochemistry, Geology.

The main purposes of the investigation were to delineate the bodies of fresh and salty ground water in the project area, to relate their occurrence and movement to geologic and hydrologic conditions, to estimate the rate of encroachment, if any, of the salty water, and to evaluate the effectiveness of the existing network of outpost wells as detectors of salt-water encroachment. (Author)

GPO-I-19.13:1539-P
Geological Survey, Washington, D. C.
GEOLOGY AND GROUND-WATER RESOURCES OF DOUGHERTY COUNTY, GEORGIA. CONTRIBUTIONS TO THE HYDROLOGY OF THE UNITED STATES
Robert L. Wait. 1963, 113p
Geological Survey Water-Supply paper 1539-P
GPO $1.25

DESCRIPTORS: *Geological survey, *Ground waters, *Hydrology, *Georgia, *Water supplies, Limestones, Structural geology, Geochemistry, Geology.

Abundant ground water is available in Dougherty County. The Ocala limestone, the sand and coquina of the Claiborne group, and the limestone unit of the Clayton formation of the Midway group are the principal aquifers in the county. Much ground water for irrigation and industry could be developed from the Ocala limestone, especially in the eastern part of the county where wells yield from 300 to 1,000 gpm. The ground water is of the calcium bicarbonate type. The water is moderately hard to hard, alkaline, and contains moderate amounts of dissolved solids. Sulfate is low or absent in water from the Ocala limestone. Water from the lower unit of the Clayton formation is of a calcium-sodium bicarbonate type. Water from the Upper Cretaceous series is of a sodium bicarbonate to sodium chloride type that is soft and may contain excessive amounts of iron. Saline water is present at depths of 2,800 feet and greater. (Author)

GPO-I-19.3:1131
Geological Survey, Washington, D. C.
GEOLOGY AND MINERAL DEPOSITS OF THE TURTLE LAKE QUADRANGLE, WASHINGTON
George E. Becraft and Paul L. Weis. 1963, 84p
Geological Survey bulletin 1131
GPO $1.50

DESCRIPTORS: *Geological survey, *Washington, *Economic geology, *Minerals, Uranium, Ores (Metal Sources), Petrology, Geology.

The mineral deposit of greatest economic value in the quadrangle is a large uranium deposit at the Midnite mine on the Spokane Indian Reservation in the north-central part of the area. The deposit consists of several ore bodies, some of which are several hundred feet long and more than one hundred feet wide, along an intrusive contact between Precambrian phyllite and Cretaceous porphyritic quartz monzonite. Except for small amounts of secondary minerals, the ore is almost entirely in the Precambrian rocks. The Midnite deposit, discovered in 1954, has been actively mined since early 1955. Tungsten has been mined intermittently at the Germania Consolidated mine, in the north-central part of the quadrangle, since about 1917. Total production is valued at about $134,000. Small prospects that contain lead, zinc, silver, and molybdenum have been explored in the area, but none have produced much ore. (Author)

GPO-I-19.3:1103
Geological Survey, Washington, D. C.
GEOLOGY AND URANIUM-VANADIUM DEPOSITS OF THE MONUMENT VALLEY AREA, APACHE AND NAVAJO COUNTIES, ARIZONA. SERPENTINE AND GARNET RIDGE. MINERALOGY AND PARAGENTS OF THE ORE DEPOSITS AT THE MONUMENT NO. 2 AND CATO SELLS MINE
Irving J. Witkind, Robert E. Thaden, Harold D. Malde, Robert E. Thaden, and Donald H. Johnson.
1963, 186p
Geological Survey bulletin 1103
GPO $3.25

DESCRIPTORS: *Geological survey, *Arizona, *Economic geology, *Uranium, *Vanadium, Ores (Metal Sources), *Mineralogy, Stratigraphy, Geology.

The work had three major objectives: (1) to accumulate data basic to an understanding of the regional geology, (2) to appraise the Triassic strata as host rocks for uranium deposits and to select areas favorable for exploration for concealed deposits, and (3) to study the controls that influence uranium deposition and from this study to establish guides useful in prospecting for uranium deposits. (Author)

GPO-I-19.3:1121-J
Geological Survey, Washington, D. C.
GEOLOGY OF THE DUCK CREEK PASS QUADRANGLE, MONTANA. CONTRIBUTIONS TO GENERAL GEOLOGY
Willis H. Nelson, 1963, 61p
Geological Survey bulletin 1121-J
GPO $1.00

DESCRIPTORS: *Geological survey, *Montana, *Stratigraphy, *Petrology, Geology.

The Belt series, which is represented in this quadrangle by the Newland, Greyson, and Spokane, is separated from rocks of Paleozoic age in this region by an uniconformity which cuts across the formations of the series at a very small angle. The Newland limestone, which is a part of the Belt series of Precambrian age, is the oldest formation in the quadrangle. The lower part of the Newland limestone that is exposed in the quadrangle is very regularly bedded, medium-gray, slightly dolomitic, argillaceous, and silty limestone, in which the beds are separated by thin dark silty layers. The Greyson shale, which overlies the Newland limestone, consists of somber shale, argillite, siltstone, and quartzite, and a little limestone. The lower 2,200 feet of the formation contains about 35 percent quartzite and a little conglomerate, and in the southern part of the quadrangle this unit is mapped as a lower member of the formation. The Spokane shale is compased of red shale, silty shale, and siltstone, and a few beds of green shale. Many of the beds of this formation are ripple marked and mud cracked. This formation is about 3,000 feet thick at the south edge of the quadrangle.

GPO-I-19.3:1063-E
Geological Survey, Washington, D. C.
GEOLOGY OF THE EDGEMONT NE QUADRANGLE, FALL RIVER AND CUSTER COUNTIES, SOUTH DAKOTA. GEOLOGY AND URANIUM DEPOSITS OF THE SOUTHERN BLACK HILLS
Garland B. Gott and Robert W. Schnabel. 1963, 137p
Geological Survey bulletin 1063-E
GPO $1.50

DESCRIPTORS: *Geological survey, *South Dakota, *Economic geology, *Uranium, Stratigraphy, Petrology, Geology, Structural geology.

Uranium deposits, which are restricted to the Inyan Kara rocks, constitute the most important economic mineral resource in the quadrangle. Most of the production has been from thick, fluviatile sandstone, but a significant proportion has been from nonfluviatile thin, tabular sandstone interbedded with carbonaceous siltstone. The thick fluviatile sandstones are channellike in shape, are approximately 1 to 5 miles in width, and are at least several tens of miles in length. Carnotite, tyuyamunite, corvusite, rauvite, uraninite, coffinite, paramontroseite, and häggite are the principal ore minerals. They occur in and around carbonaceous material, around grains and nodules of iron sulfide, adjacent to the fine-grained facies of the sandstone, in association with calcium carbonate, and on structural irregularities, particularly on structural terraces adjacent to monoclinal axes. (Author)

GPO-I-19.16:370
Geological Survey, Washington, D. C.
GEOLOGY OF THE THREE FORKS QUADRANGLE, MONTANA. PETROGRAPHY OF IGNEOUS ROCKS
G. D. Robinson and H. Frank Barnett. 1963, 150p
Geological Survey Professional Paper 370
GPO $2.25

DESCRIPTORS: *Geological survey, *Montana, *Petrology, *Igneous rocks, Sedimentary rock, Mountains, Structural geology, Geology.

A comprehensive restudy of a classic area of Rocky Mountain geology at the head of the Missouri River.

GPO-I-19.3:1132
Geological Survey, Washington, D. C.
GEOLOGY, ORE DEPOSITS, AND EXPLORATORY DRILLING IN THE DEER FLAT AREA, WHITE CANYON DISTRICT, SAN JUAN COUNTY, UTAH
Tommy L. Finnell, Paul C. Franks, and Harold A. Hubbard. 1963, 129p
Geological Survey bulletin 1132
GPO $2.25

DESCRIPTORS: *Geological survey, *Economic geology, *Utah, *Ores (Metal Sources), Uranium, Well drilling, Stratigraphy, Geology

Uranium in the Deer Flat area is mainly localized in channel fills. Ore bodies found by diamond drilling are in sandstone that fills scours in channels cut into the top of the Moenkopi formation. Ore-grade material is found in all lithologic types, but the better ore is mostly in the coarser sandstone. Coalified wood evidently has an important effect on the localization of ore,

perhaps it provides a reducing environment for ore deposition. From comparative studies of sandstone-mudstone ratios and grain size, and of lenticularity and continuity in favorable beds at the W. N. and Hideout mines, it appears that ore-grade material is localized in medium- to coarse-grained or conglomeratic sandstone interbedded with a relatively small amount of mudstone, resting on channel floors. The essential condition seems to be the presence of favorable host rock in a channel, overlain by a relatively continuous layer of mudstone that will confine the ore-bearing solutions. (Author)

GPO-I-19.13:1619-J
Geological Survey, Washington, D. C.
GROUND-WATER GEOLOGY OF EDWARDS COUNTY, TEXAS. CONTRIBUTIONS TO THE HYDROLOGY OF THE UNITED STATES
A. T. Long. 1963, 38p
Geological Survey Water-Supply paper 1619-J
GPO $0.60

DESCRIPTORS: Geological survey, *Ground waters, *Hydrology, *Texas, Limestone, Structural geology, Geology, *Water supplies.

The Edwards and associated limestones of Cretaceous age is the principal aquifer in Edwards County. It yields small to moderate quantities of water to wells throughout the county except in the southeastern part where the Edwards has been removed by erosion in the major stream valleys. The Glen Rose limestone underlying the Edwards yields small quantities of water to wells and springs, particularly in the southeastern part of the county where the Edwards is absent. Small supplies, principally for domestic and stock purposes, are obtained from alluvial deposits in the major stream valleys. Little is known concerning the water-bearing properties of the older Cretaceous rocks in the Edwards County, but they are at least partly sand and may be a potential source of ground water. The source of ground water in Edwards County is precipitation. (Author)

GPO-I-19.3:1134
Geological Survey, Washington, D. C.
ORDOVICIAN GRAPTOLITES OF THE BASIN RANGES IN CALIFORNIA, NEVADA, UTAH, AND IDAHO
Ruben J. Ross, Jr. and William B. N. Berry. 1963, 199p
Geological Survey bulletin 1134
GPO $1.75

DESCRIPTORS: *Geological survey, *California, *Nevada, *Utah, *Idaho, *Paleontology, Stratigraphy, Geology

A compilation, with descriptions and illustrations, of the more common species and genera of graptolites in the Great Basin.

GPO-I-19.16:429-A
Geological Survey, Washington, D. C.
QUANTITATIVE AND QUALITATIVE ANALYSIS OF THE FAMILY BOLIVINIDAE. RECENT FORAMINIFERA OFF CENTRAL AMERICA
Patsy B. Smith. 1963, 71p
Geological Survey Professional Paper 429-A
GPO $2.75

DESCRIPTORS: Geological survey, *Marine biology, *Foraminifera, *Ocean bottom sampling, *Central America, Paleoecology, Paleontology, Statistical analysis, Oceanology.

A study based primarily on 22 core samples collected at ocean depths of 20 to 3,200 meters on 2 traverses off the coast of El Salvador.

TID-18953
William Marsh Rice Univ., Houston, Tex.
GEOLOGIC ASPECTS OF THORIUM RECOVERY FROM COMMON ROCKS. Final rept. 1 Jun 62-31 May 63. 16p
Contract W7405-eng-26
OTS $1.60

DESCRIPTORS: *Thorium, *Uranium, *Granite, New Hampshire, Geology.

Oceanography

UCRL-7197
Lawrence Radiation Lab., Univ. of California, Livermore.
A DIAGNOSTIC MODEL USING ASHFALL DATA TO DETERMINE ERUPTION CHARACTERISTICS AND ATMOSPHERIC CONDITIONS DURING A MAJOR VOLCANIC EVENT
Joseph B. Knox and Nicholas M. Short. [1963] 30p
Contract W7405-eng-48
OTS $2.60

UCRL-7605
Lawrence Radiation Lab., Univ. of California, Livermore.
HIGH TEMPERATURE THERMAL CONDUCTIVITY OF SIX ROCKS
D. R. Stephens. 21 Nov 63, 16p
Contract W7405-eng-48
OTS $0.50

PB-165 183
Scripps Institution of Oceanography, Univ. of California, La Jolla.
ORBITAL VELOCITY ASSOCIATED WITH WAVE ACTION NEAR THE BREAKER ZONE
Douglas L. Inman and Noriyuki Nasu. Mar 56, 81p
Contract DA49-055-eng-3
BEB Technical memo. no. 79; AD-98 208
OTS $8.10

DESCRIPTORS: *Water waves, *Hydrodynamics, *Ocean waves, Beaches, Erosion, Velocity, Pressure, Measurement, Oceanology

The orbital velocity associated with ocean surface waves in shallow water was measured for various wave conditions at La Jolla California, as part of a program of study of sand transport and beach erosion. The observed maximum horizontal velocities compare favorably with velocities predicted from solitary wave theory for most waves with simple profiles when the ratio of the wave height to water depth is greater than about 0.4. The agreement with theory is somewhat better for longer period waves, and in some cases is still quite good in regions where the ratio of wave height to water depth

is less than about 0.2. On the average, the onshore velocity associated with the passage of a wave crest was greater in magnitude and of shorter duration than the offshore velocity under the wave trough. The differences in crest and trough velocities varied from wave to wave, but in general correlated with the shape of the waves. (Author)

PB-165 195
Texas A and M. Univ., College Station.
CIRCULATION OF ANTARCTIC INTERMEDIATE WATER DEDUCED THROUGH ISENTROPIC ANALYSIS. Final rept.
Albert D. Kirwan. Dec 63, 75p
Grant NSF G-13664
Reference 63-34-F
OTS $7.60

DESCRIPTORS: Oceanology, *Ocean currents, *Antarctic regions, Salinity, Diffusion, Measurement, *Entropy, Analysis, Oceanographic data.

The primary objective of this research was to estimate the eddy diffusion of salinity along and across the isentropic surfaces of the Antarctic Intermediate Water. In order to accomplish this goal it was necessary to perform several steps. Three such steps were: (1) the determination of the isentropic surfaces most characteristic of the Intermediate Water; (2) the estimation of the topography of these surfaces and of salinity along these surfaces; and (3) the calculation of the circulation on these surfaces. A summary of the results of the computations made in steps (2) and (3) above is contained herein.

Physics of the Atmosphere

NASA-TR-R-143
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SPECTRUM OF HYDROMAGNETIC WAVES IN THE EXOSPHERE
Gordon J. F. MacDonald. Dec 62, 62p
N64-16006
OTS $1.75

GPO-C-13.46:178
National Bureau of Standards, Boulder, Colo.
AN INTERPOLATION PROCEDURE FOR CALCULATING ATMOSPHERIC BAND ABSORPTIONS FROM LABORATORY DATA
LeAnn Droppleman, Lawrence R. Megill, and Robert F. Calfee. 3 Jun 63, 20p
Technical note 178; N63-16744
GPO $0.20

DESCRIPTORS: *Atmosphere, *Carbon dioxide, *Infrared radiation, Absorption, Band spectrum, Infrared spectroscopy,

A technique used for the calculation of absorption of the 4.3μ band of CO_2 was extended to the 2.0μ, 2.7μ, and 15μ bands of CO_2. Results obtained agree favorably with the experimental data available. (Author)

ENGINEERING

PB-165 140
Battelle Memorial Inst., Columbus, Ohio.
IMPROVEMENTS IN CAPSULES FOR SENSITIVE ALTIMETERS. Progress rept., 6 May-6 Jun 47
H. J. Grover and L. R. Jackson. 6 Jun 47, 25p
Contract W36-039-sc-32069
AD-142 522
OTS $2.60

DESCRIPTORS: *Altimeters, Containers, Materials, *Beryllium alloys, *Cobalt alloys, *Nickel alloys, Aging (Materials), Cold working, Tensile properties,

Some drift and recovery tests on Berylco 25 sheet are reported. Results of tests on 0.030-inch Berylco 25, 1/2 hard stock indicate that the aging response is the same as found for the thinner diaphragm stock 0.006 inch thick. Peak strength was obtained after an eight-hour aging treatment at 600°F. From the tests to determine the effects of different solution temperatures and cooling rates from the solution temperature on the aging characteristics of beryllium-copper material, it was found a satisfactory strength was obtained after a sample was cooled moderately fast (not quenched in water) from the five-minute treatment at 1475°F. and then aged at 600°V. Z-nickel material, 2 Nos. hard, 0.006 inch thick, aged eight hours at 1050°F., possessed a strength of 177,000 psi. which was not materially increased by a prolonged aging treatment. Cold working Z-nickel material only increased the over-all strength of the material when compared with as-received stock and for all physical properties reported had had no effect on the general time of aging treatment. (Author)

TID-18960
Cornell Univ., Ithaca, N. Y.
AN AUTOMATED SYSTEM FOR THE MEASUREMENT OF INTERNAL FRICTION
Randall K. Cole, Jr. Jun 63, 28p
Contract AT(30-1)2471
OTS $2.60

DESCRIPTORS: *Internal friction, Measuring devices (Electrical and electronic).

GEAP-4202
General Electric Co., San Jose, Calif.
TWO-PHASE PRESSURE LOSSES. Quarterly progress rept. no. 4, 12 Nov 62-12 Feb 63
E. Janssen and J. A. Kervinen. 1 Mar 63, 21p
Contract AT(04-3)189
OTS $2.60

DESCRIPTORS: *Fluid flow, Friction, *Pressure, Pipes.

NASA-TN-D-1917
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
PROBLEMS IN THE CONSTRUCTION OF A SPACE ENVIRONMENT SIMULATOR
Dana S. Cope. Mar 64, 16p
N64-16316
OTS $0.50

NASA-TN-D-2146
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
RESPONSE OF MODIFIED REDHEAD MAGNETRON AND BAYARD-ALPERT VACUUM GAUGES ABOARD EXPLORER XVII
G. P. Newton, D. T. Pelz, G. E. Miller, and R. Horowitz. Feb 64, 13p
N64-15796
OTS $0.50

N64-14847
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ANALYSIS OF MOVABLE LOUVERS FOR TEMPERATURE CONTROL
Joseph A. Plamondon. 1 Jan 64, 17p
Contract NAS7-100
Technical rept. no. 32-555; NASA CR-53046
OTS $1.60

PB-165 141
Navy Underwater Sound Lab., Fort Trumbull, New London, Conn.
DESIGN AND FABRICATION OF SPHERICAL BUOYANCY CHAMBERS
George F. Carey. 24 Sep 60, 41p
Contract Nonr-266(66)
USL Research rept. no. 472; AD-246 798
OTS $4.60

DESCRIPTORS: *Floats, Buoys, Spheres, Design, Construction, Aluminum, *Underwater equipment, *Sonar equipment, Towers.

Four rigid and two flexible spherical buoyancy chambers to support sonar towers emplanted in the deep ocean were fabricated. The spheres had a minimum buoyancy of 280 pounds, a maximum buoyancy-to-weight ratio, a test pressure of 3500 psi, and a maximum working pressure of 3400 psi. This report is a brief account of the problems encountered and the results achieved in building these spheres. (Author)

AD-255 925
Research and Advanced Development Div., Avco Corp., Wilmington, Mass.
THERMAL STRESS TESTS OF MULTILAYERED SPHERICAL SHELLS IN THE TEN-MEGAWATT ARC SHROUD FACILITY.
Pre-test rept.
Albert J. Gravallese. 28 Apr 61, 18p
Contract AF04(647)305
Technical memo. no. RAD-TM-61-13
OTS $1.60

DESCRIPTORS: *Re-entry vehicles, *Radomes, *Structural shells, Re-entry aerodynamics, *Aerodynamic configurations, Sweat cooling, *Thermal stresses, Aerodynamic heating, Atmosphere entry, Test facilities, Ablation, Ceramic coatings, Heat resistant polymers, Plastic coatings, Ceramic materials, Hemispherical shells, Materials, Guided missiles.

This pre-test report is part of the Task VII terminal guidance radome feasibility design studies, and is presented so that the maximum benefit may be derived from the test results. It is an effort to do the following: (a) inform those concerned of the intent and objectives of the tests and the course to be followed, (b) present areas of difficulties, if any, so that they may be resolved prior to their occurrence, (c) solicit suggestions that may benefit the over-all results, and (d) act as a guide for planning. (Author)

SCTM-322-62(14)
Sandia Corp., Albuquerque, N. Mex.
PORTABLE TRANSMITTER THERMAL DESIGN
John W. Allen. Feb 63, 37p
Contract AT(29-1)789
OTS $3.60

SCTM-420-58(51)
Sandia Corp., Albuquerque, N. Mex.
PREDICTING THE MUZZLE VELOCITY OF A COMPRESSED GAS GUN
N. E. Hawk. 3 Dec 58, 15p
Contract AT(29-1)789
OTS $1.60

SC-4799(M)
Sandia Corp., Albuquerque, N. Mex.
THEORY AND TECHNIQUES OF ENVIRONMENTAL TESTING. May 63, 118p
Contract AT(29-1)789
OTS $9.60

DESCRIPTORS: *Environmental tests,

Aeronautical Engineering

NASA-TN-D-2133
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
LARGE-SCALE WIND-TUNNEL TESTS OF AN AIRPLANE MODEL WITH AN UNSWEPT TILT WING OF ASPECT RATIO 5.5, AND WITH VARIOUS STALL CONTROL DEVICES
James A. Weiberg and Demo J. Giulianetti. Feb 64, 44p
N64-14728
OTS $1.25

NASA-TN-D-2181
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
ANALYTICAL STUDY OF AIRCRAFT-DEVELOPED SPINS AND DETERMINATION OF MOMENTS REQUIRED FOR SATISFACTORY SPIN RECOVERY
Ernie L. Anglin and Stanley H. Scher. Feb 64, 88p
N64-15330
OTS $2.25

NASA-TN-D-2185
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A BRIEF STUDY OF CLOSED-CIRCUIT TELEVISION FOR AIRCRAFT LANDING
John P. Reeder and Joseph J. Kolnick. Feb 64, 9p
N64-15223
OTS $0.50

NASA-TN-D-2052
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE DESIGN OF SAILPLANES FOR OPTIMUM THERMAL SOARING PERFORMANCE
Clarence D. Cone, Jr. Jan 64, 50p
N64-14982
OTS $1.25

NASA-TN-D-2183
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
PERFORMANCE CHARACTERISTICS OF A PREFORMED ELLIPTICAL PARACHUTE AT ALTITUDES BETWEEN 200,000 AND 100,000 FEET OBTAINED BY INFLIGHT PHOTOGRAPHY
Charles H. Whitlock and Harold N. Murrow. Feb 64, 27p
N64-15222
OTS $0.75

AD-417 415 repriced
Martin Marietta Corp., Baltimore, Md.
MANUFACTURING METHODS AND DESIGN PROCEDURES OF BRAZED REFRACTORY METAL HONEYCOMB SANDWICH PANELS. Final rept. 20 Nov 61-30 Sep 63
J. W. McCown, C. R. Wilks, L. J. Gagola, A. Norton, and M. Schwartz. Nov 63, 215p
Contract AF33(657)7276
ASD-TDR-63-767
OTS $3.50

DESCRIPTORS: *Airplane panels, *Sandwich panels, *Honeycomb cores, Design, Manufacturing methods, *Heat-resistant metals and alloys, *Molybdenum alloys *Niobium alloys, *Brazing, Silver solders, Refractory coatings,

Manufacturing methods and design procedures were developed for fabricating details and vacuum brazing of TZM (Mo-0.5 Ti-0.07 Zr) molybdenum and D-36 (Cb-10Ti-5Zr) columbium alloy honeycomb sandwich panels. These included the marforming of thin sheet, the welding and finishing of honeycomb core and the high temperature vacuum brazing of honeycomb sandwich panels. Panels simulating a heat shield and a structural application on aerospace vehicles were designed, fabricated and tested at temperatures up to 2600°F. The capability of fabricating, coating and utilizing brazed columbium sandwich panels on aerospace vehicles, with the required design procedures for application at temperatures up to 2400°F, was demonstrated. Only partial success was achieved with the TZM molybdenum alloy, because of the manufacturing problems created by severe welding problems, encountered in edge sealing of TZM panels. All joints could be electron beam welded, but sporadic cracking upon cooling could not be eliminated. The trouble was considered to stem from high weld restraint and metallurgical incompatibilities in braze alloy--TZM weldments. (Author) (See also AD-426 680).

SCTM-205-61(71)
Sandia Corp., Albuquerque, N. Mex.
AIRSPEEDS, THEIR MEANING AND USE
Ira T. Holt. Jul 62, 18p
Contract AT(29-1)789
OTS $1.60

DESCRIPTORS: *Airspeed, *Flight.

AD-284 455
Weber Aircraft Corp., Burbank, Calif.
ANALYSIS OF A HIGH SPEED ENCAPSULATED SEAT CREW ESCAPE SYSTEM FOR ZERO SPEED AND ZERO ALTITUDE CAPABILITY. Final rept. for Feb 61-Feb 62, on Crew Escape for Flight Vehicles
M. A. Rickards. Aug 62, 709p
Contract AF33(616)7923
ASD-TDR-62-242
OTS $28.50

DESCRIPTORS: *Jettisonable cockpits, *Short-take-off planes, *Vertical take-off planes, *Parachutes, Euler's angles, *Aviation safety, *Abandonment, Analog computers, Vector analysis, Graphic analysis, Equations.

The equations of motion for six degrees of freedom of a high speed encapsulated crew escape system were developed and formulated into the ASD analog computer. Problem areas encountered were bad lateral response, beyond limits of human tolerance to acceleration at high speeds and adverse effects of ejector rocket thrust to c. g. misalignment at low speeds. Method of evaluating linear G loads for six degree of freedom system is given. Recommended configuration required to meet 800 knots E. A. S. and zero-zero escape requirements features aerodynamic spoilers, generation of a lateral afterbody, the "self seeking" nozzle and the ballistic landing spike. (Author)

Chemical Engineering

ANL-SL-SL-2342
Argonne National Lab., Ill.
MASS TRANSFER FROM A VERTICAL PLATE OF NAPHTHALENE TO A SURROUNDING AIR-FLUIDIZED BED
John T. Holmes and W. Jay Pettit. Nov 62, 23p
Contract W31-109-eng-38
UAC-7089
OTS $2.60

DESCRIPTORS: *Naphthalenes, *Mass transfer, *Programming (Computers).

AD-401 091
F and M Scientific Corp., Avondale, Pa.
A COMPLETELY CONTINUOUS CHROMATOGRAPH FOR PURIFICATION OF BORON COMPOUNDS. Final rept., 1 Feb 61-31 Jul 62
C. B. Euston, J. Peters, F. J. Debbrecht, and J. M. Kauss. 21 Feb 63, 49p
Contract AF19(604)8045
AFCRL-62-731; N63-14601
OTS $4.60

DESCRIPTORS: *Boron compounds, Purification, Separation, *Gas chromatography, *Liquid rocket propellants, *Pentaboranes.

The report discusses the design and construction of a gas chromatograph to purify a boron compound, to be later decomposed to pure elemental boron. No commercial unit is currently available to do this either on a truly continuous basis such as this unit operates, or in the quantities of compound which can be prepared. The difficulties encountered and methods used to solve them are discussed. Successful operation is illustrated by purification of a hydrocarbon mixture, collection of

purified fractions and analysis of these fractions by a highly sensitive flame ionization gas chromatograph. Purities to 99.99% have been obtained. The boron compound chosen for this work was stable pentaborane B_5H_9, a toxic, highly reactive liquid propellant fuel, which required special design and handling techniques. (Author)

PB-181 672
General Electric Co., Burlington, Vt.
DIFFUSION STILL ANALYSIS
Peter Kroeger. Apr 64, 280p
Contract 14-01-0001-314
Saline Water Research and Development Progress rept. no. 99
OTS $4.00.

DESCRIPTORS: *Sea water, *Desalinization, *Distilling plants, Design, Analysis, *Heat transfer, *Mass transfer, Models (Simulations)

Analytical models for single- and multi-stage diffusion still performance were developed, giving a more detailed understanding of the heat and mass transfer mechanisms and permitting performance predictions beyond the range of available test equipment. The influence of various design and process parameters were studied. Previous tests were extended and an existing multi-stage unit was modified for salt water operation. Test data were then compared with the analytical results to substantiate their validity.

MCW-1482
Mallinckrodt Chemical Works, Weldon Spring, Mo.
PROCESS DEVELOPMENT. Quarterly progress rept. for Jul-Sep 63. 1 Nov 63, 47p
Contract W14-108-eng-8
OTS $1.00

PB-181 673
Massachusetts Inst. of Tech., Cambridge.
TEMPERATURE DISTRIBUTION IN THE CRYSTALLIZATION OF UNDERCOOLED LIQUIDS IN CYLINDRICAL TUBES
P. L. T. Brian and P. R. Sperry. May 64, 52p
Contract 14-01-0001-295
Office of Saline Water Research and Development Progress rept. no. 98
OTS $1.50

DESCRIPTORS: *Sea water, *Desalinization, *Crystallization, Dynamics, *Capillary tubes, *Heat transfer, Temperature, Distribution.

A popular technique for the determination of the crystallization kinetics of undercooled pure liquids involves the use of samples of the liquid contained in thin-walled capillary tubes. A capillary, containing a seed crystal near one end, is immersed in a cooling bath maintained at a constant temperature below the freezing point of the liquid. The velocity of growth of a face of the crystal which has been oriented normal to the capillary axis is then observed over a range of temperature of the cooling bath. The overall temperature difference between the cooling bath and the interface is that necessary to conduct the heat of fusion away from the interface, through the walls of the tube, and through the fluid boundary layer surrounding the tube. Previous analyses have not adequately considered the latter resistance to heat transfer, convection from the capillary surface to the bulk of the cooling bath. The results of the present analysis show that appreciable error in the estimation of the amount of temperature rise at the solid-liquid interface can arise from failure to consider this convective heat-transfer resistance. (Author)

GPO-I-1.1/3:963
Office of Saline Water, Dept. of the Interior, Washington, D. C.
SALINE WATER CONVERSION REPORT FOR 1962. [1963] 178p
GPO $1.25

DESCRIPTORS: *Sea water, *Desalinization, Reviews, Distilling plants, Evaporators, Membranes, Electrodialysis, Ion exchange, Freezing, Hydrates, Solvent extraction,

Civil Engineering

PB-165 198
Building Research Advisory Board, NAS-NRC, Washington, D. C.
LIST OF TECHNICAL STUDIES. 1 Feb 64, 58p
FHA no. 470 Revised
OTS $5.60

DESCRIPTORS: *Buildings, Construction, Standards, *Structures, *Drainage, *Sanitary engineering, *Soils, Bibliographies,

The FHA list is divided into five broad categories: (1) Studies Under Contract, (2) Studies Under Consideration by the Technical Studies Advisory Committee, (3) Subjects of Potential Research Interest to the FHA and the Technical Studies Advisory Committee, (4) Completed Studies and Reports, and (5) Evaluation and Inspection Aids Developed. These categories are further divided into seven technical groups, and FHA has assigned a series number designation and brief study objective to each problem. The groups consist of: (1) Mechanical, (2) Structural, (3) Streets and Drainage, (4) Sanitary, (5) Soils, (6) Architectural, and (7) Miscellaneous. (97 refs) (Author)

PB-165 175
Minnesota Univ., Minneapolis. Engineering Experiment Station.
STUDY OF QUONSET WALLS FOR DETERMINATION OF THERMAL CONDUCTIVITY FACTORS. Final rept. 15 Sep 52, declassified 13 Nov 52, 73p
Contract NOy-27475
AD-94 716
OTS $7.60

DESCRIPTORS: *Prefabricated buildings, *Thermal insulation, Structural parts, Thermal conductivity

Investigation was conducted to study heat transmission through standard Navy-type Quonset walls and to determine the effect of different insulation applications on the thermal resistance of Quonset structures. The insulating materials included are in the following general classifications: (1) blankets, (2) membranes, (3) furring strips, and (4) structural fiberboard. The complete series of tests were run on all walls only in the

vertical position at a mean temperature of 40°F. The relationship between coefficients under various conditions was obtained by applying conversion factors determined from test results of representative walls. Tables are presented which summarize the over-all coefficients of heat transfer for the different walls in the vertical and horizontal position at mean temperatures of 40° and 105°F. The percent reduction based upon the uninsulated wall is given for each condition. (DDC abstract)

Electrical and Electronic Engineering

PB-165 168
Aerojet-General Corp., Azusa, Calif.
AN INVESTIGATION LEADING TO THE DEVELOPMENT OF CHLORINE-DEPOLARIZED BATTERIES FOR GUIDED MISSILES. Quarterly rept. no. 1, 1 Apr-30 Jun 54
L. J. Gordon, J. D. Miller and others [1954] 28p
Contract DA36-039-sc-56742
[Rept. no. 3833-1]; AD-40 480
OTS $2.60

DESCRIPTORS: *Batteries and components, *Chlorine, Polarization, *Guided missile batteries, Primary cells.

PB-165 169
Aerojet-General Corp., Azusa, Calif.
AN INVESTIGATION LEADING TO THE DEVELOPMENT OF CHLORINE-DEPOLARIZED BATTERIES FOR GUIDED MISSILES. Quarterly rept. no. 2, 1 Jul-30 Sep 54.
L. J. Gordon and J. D. Miller. [1954] 32p
Contract DA36-039-sc-56742
Rept. no. 3833-2; AD-53 165
OTS $3.60

DESCRIPTORS: *Batteries and components, *Chlorine, Polarization, *Guided missile batteries, Primary cells,

See also PB-165 168

PB-165 170
Aerojet-General Corp., Azusa, Calif.
AN INVESTIGATION LEADING TO THE DEVELOPMENT OF CHLORINE-DEPOLARIZED BATTERIES FOR GUIDED MISSILES. Quarterly rept. no. 4, 1 Jan-31 Mar 55, on Development of Chlorine-Depolarized Batteries
S. B. Kilner and L. J. Gordon. 29 Apr 55, 19p
Contract DA36-039-sc-56742, continuation of Contract DA36-039-sc-42706
Rept. no. 3833-4; AD-69 485
OTS $1.60

DESCRIPTORS: *Batteries and components, *Chlorine, Polarization, *Guided missile batteries, Primary cells.

Low-resistance zinc duplex coatings appear to deteriorate and cause impaired battery performance after approximately one year. It may be necessary to accept higher internal resistance to achieve shelf life in excess of one year. New shelf-life storage containers have been designed and are being tested. Prototype batteries have been tested. Output was lower than expected on the basis of 5-cell tests. Case strength is inadequate for the unusual conditions encountered; new cases have been designed and are under construction. Alternating-current measurements of internal resistance afford non-destructive tests of unactivated batteries. This permits following battery life during storage, and will allow testing of battery quality before installation. The presence of relatively large amounts of air in the test chamber resulted in uniform corrosion rather than unused center portions of cells; peak voltage was little affected although initial voltage was substantially lower than usual. Thin coated zincs (0.005 in.) will be available in the near future. Material balance measurements on 5-cell batteries have been made. Zinc efficiencies of 63% were found. (Author) (See also PB 165 169)

PB-165 171
Aerojet-General Corp., Azusa, Calif.
AN INVESTIGATION LEADING TO THE DEVELOPMENT OF CHLORINE-DEPOLARIZED BATTERIES FOR GUIDED MISSILES. Quarterly rept. no. 5, 1 Apr-30 Jun 55, on Development of Chlorine-Depolarized Batteries
B. S. Kilner and L. J. Gordon. 15 Jul 55, 10p
Contract DA36-039-sc-56742
Rept. no. 3833-5; AD-66 721
OTS $1.10

DESCRIPTORS: *Batteries and components, *Chlorine, Polarization, Guided missile batteries, Primary cells.

Progress is reported on the development of the Zn-Cl battery. Data are tabulated on the performance of batteries stored for periods up to 2 mo. A rugged plastic case was developed which proved satisfactory for shelf storage of 5-cell batteries. A means for removing H from stored batteries is being considered. Preliminary tests indicated that a vinyl film will pass H but will retain moisture. A lot of thin Zn anodes (0.005 in. thick) showed good performance in freshly assembled Zn-Cl cells. A polyvinyl alcohol film used as a separator in place of cellophane disintegrated immediately upon contact with Cl. Several steel cases, each weighing 2 lb and designed to withstand 1000-psig internal pressure, will be used to determine the operating characteristics of the 20-cell prototype battery under various conditions. (DDC abstract) (See also PB-165 170)

PB-165 189
[Aeronautical Systems Div., Air Force Systems Command] Wright-Patterson AFB, Ohio.
SCIMITAR ANTENNA. Rept. on Development of Antennas and Antenna Techniques for Electronic Reconnaissance
William P. Turner and Edwin M. Turner. Sep 57, 25p
WADC-TN-57-307; AD-131 016
OTS $2.60

DESCRIPTORS: *Airplane antennas, Broadband, Miniature electronic equipment, *Antenna configurations, Design, Antenna radiation patterns, Electrical impedance, Aerial reconnaissance,

The effort to develop a broadband, low drag, easily mounted antenna having stable patterns and impedance has resulted in the Scimitar Antenna which is essentially a co-planar equiangular stub antenna which has a folded-over shorted base. This design makes for extreme simplicity in construction and installation. The unusual bandwidth, pattern, impedance, and polarization characteristics can be adapted to military applications. (Author)

PB-165 190
American Inst. for Research, Pittsburgh, Pa.
MAINTENANCE DIAGRAMS FOR PREVENTIVE MAINTENANCE OF GROUND ELECTRONIC EQUIPMENT: PHASE I. RECOMMENDATIONS FOR DETERMINING THEIR NEED
Alan D. Swain. Nov 56, 184p
RADC TR 56-141; AD-114 349
OTS $13.00

DESCRIPTORS: Feasibility studies, *Maintenance equipment, *Training devices, Display systems, *Electronic equipment, Malfunctions, *Graphic analysis, Maintenance personnel

A research project was set up (1) to determine what maintenance information should be presented in diagram (grafic aids) form for preventive maintenance operations of ground electronic equipment and (2) to decide the best method of presenting this information in diagram form. This report lists the over-all information the apprentice mechanic needs for preventive maintenance operations and recommends the most efficient sources for this information. Four basic classes of Preventive Maintenance Diagrams covering 16 types of PMD's are recommended for that maintenance information to be presented in diagrams. The next phases of the research effort will be to develop, describe, and field-test the recommended design for each type of Maintenance Diagram needed for PM routines. (Author)

NASA-CR-2
Electronic Communications, Inc., Timonium, Md.
TECHNIQUES FOR SUPERHETERODYNE RECEIVERS ABOVE 100 GIGACYCLES
R. F. Packard, ed. Feb 64, 68p
Contract NASw-259
N64-14937
OTS $1.75

AD-277 065
General Telephone and Electronics Labs., Inc., Bayside, N. Y.
STUDY OF FAILURE MECHANISMS IN HIGH POWER RADIO FREQUENCY GENERATING DEVICES.
Quarterly rept. no. 1
M. Friedman Axler and R. A. Hein. 31 Mar 62, 130p
Contract AF30(602)2595
Rept. no. TR62-254.1; RADC-TDR-62-268
OTS $10.10

DESCRIPTORS: *Microwave equipment, Generators, *Traveling-wave tubes, Diodes (Electron tubes), *Electron tube heaters, Reliability (Electronics), *Gas analysis, *Mass spectroscopy,

An investigation was initiated on the source and behavior of gases present in gridded power traveling wave tubes with a view to determining the causes of tube failures. The gas analyses were made on an operating tube by means of an attached omegatron mass spectrometer. The omegatron is also used to investigate gas evolution of individual tube components. For knowledge of the total gas content of a material which can be released upon heating, a hot extraction method is used in conjunction with a commercial mass spectrometer. Early data are presented on a tube under life test, a heater coil and kovar tube components. (Author)

NASA-TN-D-2108
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
DEVELOPMENT OF A BRUSHLESS DC MOTOR FOR SATELLITE APPLICATION
Philip A. Studer. Feb 64, 14p
N64-15908
OTS $0.50

NASA-TN-D-2015
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
INVESTIGATION OF THE CALORIMETRIC EFFICIENCY OF A SPLIT-RIB UMBRELLA-TYPE PARABOLOIDAL SOLAR ENERGY CONCENTRATOR
John D. Camp and William D. Nowlin. Mar 64, 25p
N64-16116
OTS $0.75

NASA-TN-D-2118
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EFFECT OF SEEDING AND ION SLIP ON ELECTRON HEATING IN A MAGNETOHYDRODYNAMIC GENERATOR
Frederic A. Lyman, Arthur W. Goldstein, and John E. Heighway. Feb 64, 46p
N64-15197
OTS $1.25

Presented at the 4th Symposium on Engineering Aspects of Magnetohydrodynamics, Berkeley, California, Apr 10-11, 63.

NASA-TN-D-2168
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
HEAT-REJECTION AND WEIGHT CHARACTERISTICS OF FINTUBE SPACE RADIATORS WITH TAPERED FINS
Henry C. Haller, Seymour Lieblein, and Gordon C. Wesling (GE Co.). Feb 64, 38p
N64-15347
OTS $1.00

AD-269 239
Litton Systems, Inc., Woodland Hills, Calif.
PASSIVE COMPONENTS IN A HYPERNUCLEAR ENVIRONMENT
Alvin B. Kaufman and Leonard B. Gardner. Aug 61, 27p
Contract AF33(616)41452
ASD TN 61-99
OTS $2.60

DESCRIPTORS: *Radiation damage, *Radiation effects, Electronic equipment, Gamma rays, Neutron flux density, Fast neutrons, Materials.

The performance characteristics of passive components were examined dynamically during and after their exposure to a hypernuclear environment. The devices and materials irradiated were selected for test on the basis of analytical and literature research. The hypernuclear environment consisted of a fast neutron exposure in excess of 10 to the 16th power/sq cm above an energy of 2.9 Mev, accompanied by a gamma exposure in excess of 10 to the 11th power ergs/gm (C). This total integrated exposure was

accumulated during 100 hours in a ground test reactor facility. The purpose was to find passive components suitable for application within the electronic systems of Litton's NGL inertial guidance platform. As such, the characteristics of resistive, capacitive, printed circuit board, and connector components and materials were among those determined. (Author)

NASA-SP-5002
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
RELIABLE ELECTRICAL CONNECTIONS. Technology Handbook
James A. Gay, Jr. Dec 63, 78p 3d ed.
N64-15733
OTS $0.70

GPO-C-13.11:83
National Bureau of Standards, Washington, D. C.
TABULATION OF DATA ON RECEIVING TUBES
C. P. Marsden and J. K. Moffitt. 23 May 63, 134p
Handbook 83, supersedes Handbook 68
GPO $1.25

DESCRIPTORS: *Electron tubes, *Tables, Radio receivers, *Handbooks,

A tabulation of Receiving-Type Electron Tubes with some characteristics of each type has been prepared in the form of two major listings, a Numerical Listing in which the tubes are arranged by type number, and a Characteristic Listing in which the tubes are arranged by tube type and further ordered on the basis of one or two important parameters. The tabulation is accompanied by a listing of similar tube types and basing connections for the listed tubes. (Author)

GPO-C-13.46:186
National Bureau of Standards, Washington, D. C.
TABULATION OF PUBLISHED DATA ON SOVIET ELECTRON DEVICES
Charles P. Marsden. 3 Jun 63, 74p
Technical note 186; N64-13953
GPO $0.45

DESCRIPTORS: *Electronic equipment, Tables, *Electron tubes, *Microwave equipment, *Semiconductors devices, Flash lamps, Thermocouples, Thermistors, Stroboscopes,

The tabulation includes published data on Soviet electron devices as collected from various publications, mostly handbooks published by the various ministries and institutes of the USSR. Information is given on all active devices ranging from receiving to microwave devices, semiconductor devices, and various miscellaneous devices such as, for example, photographic flash tubes and thermistors. (Author)

PB-165 144
Nickel Cadmium Battery Corp., Easthampton, Mass.
INVESTIGATIONS OF THE IMPROVEMENT IN THE PERFORMANCE CHARACTERISTICS OF THE NICKEL-CADMIUM BATTERY. Quarterly progress rept. no. 2, 15 Aug-14 Nov 56
Arthur Fleischer. [1956] 56p
Contract DA36-039-sc-72318
AD-127 954
OTS $5.60

DESCRIPTORS: *Batteries and components, *Nickel alloys, *Cadmium alloys

PB-165 162
Pratt and Whitney Aircraft, East Hartford, Conn.
RESEARCH ON A 500 WATT SOLAR REGENERATIVE H_2-O_2 FUEL CELL POWER SUPPLY SYSTEM.
Semiannual rept. no. 2, 1 Jan-30 Jun 60
John M. Lee [1960] 116p
Contract DA36-039-sc-85259
ARPA Order no. 80-59; AD-241 839
OTS $9.60

DESCRIPTORS: *Energy conversion, Solar radiation, *Fuel cells, Oxygen, Hydrogen, *Electrochemistry, Electrolysis, Separation, Spacecraft, *Power supplies, Weightlessness.

The research investigations were devoted primarily to establishing the variables for minimum power electrolysis and maximum efficiency gas-liquid separation. Investigations at low temperatures and pressures are nearly complete and resulted in mathematical correlation of electrolysis data. Efficient gas-liquid separation was demonstrated in the vortex separator test facilities. Preliminary system analysis was started and high temperature, high pressure test facilities are being established. (Author) (See also PB-165 126)

PB-165 163
Pratt and Whitney Aircraft, East Hartford, Conn.
RESEARCH ON A 500 WATT SOLAR REGENERATIVE H_2-O_2 FUEL CELL POWER SUPPLY SYSTEM.
Final rept., 15 Oct 59-15 Oct 60
John M. Lee. [1960] 162p
Contract DA36-039-sc-85259
PWA-1894; ARPA Order no. 80-59; AD-250 721
OTS $12.00

DESCRIPTORS: *Energy conversion, Solar radiation, *Fuel cells, Oxygen, Hydrogen, *Electrochemistry, Electrolysis, Separation, Spacecraft, *Power supplies, Weightlessness.

Research investigations were undertaken leading to the development of a regenerative 500 watt hydrogen-oxygen fuel cell system. Research established the important variables and their values for minimum power electrolysis and maximum efficiency gas-liquid separation. Electrolysis investigations at both low and high temperatures and pressures have resulted in mathematical correlations of electrolyzer behavior. Efficient gas-liquid separation has been demonstrated in vortex separator test facilities. A limited amount of testing was performed on a low pressure, low temperature combined electrolysis gas-liquid separation unit. A preliminary system design analysis has been completed on the regenerative portion of the system. Continued development of this system is recommended. (Author) (See also PB-165 162)

PB-165 174
Radio Corp. of America, Camden, N. J.
STUDY OF ARMY TELEVISION PROBLEMS. VOLUME 2. STUDY OF HIGH DEFINITION TELEVISION TECHNIQUES. Final rept. for 15 Jul 53-15 Mar 54
C. T. Shelton. 15 May 54, 70p
Contract DA36-039-sc-56653
AD-44 143
OTS $6.60

DESCRIPTORS: *Television communication system, *Television equipment, Iconoscopes, Sensitivity, Military requirements.

The Schade method which provides a means of comparing different types of imaging systems was used as the basis of determining system resolution for any given application. The effect on resolution of each component of a TV system is considered, and then a number of such components are combined to estimate the resolution of typical systems. The pickup tubes were given the greatest attention; it was felt that the choice of the pick-up tube will have the greatest effect on the over-all characteristics of the system. Several types of pickup tubes are available which differ widely in their capabilities and limitations. A less extensive treatment is given other components used in TV, such as kinescopes and lenses, which show much less variation in their characteristics. Characteristics closely related to system resolution such as sensitivity, noise, and image lag are given full consideration. Also considered are the relative complexities of the various tubes. (DDC abstract)

SCTM-71-57(14)
Sandia Corp., Albuquerque, N. Mex.
DETERMINATION OF Q FACTORS AND OPERATING CHARACTERISTICS FOR MICROWAVE CAVITIES AND OSCILLATORS
W. P. Stearns. 12 Apr 57, 76p
Contract AT(29-1)789
OTS $7.60

DESCRIPTORS: *Microwave oscillators, *Cavity resonators

SCTM-218-61(13)
Sandia Corp., Albuquerque, N. Mex.
A FERROELECTRIC TIMER.
G. A. Kinemond and R. J. Martin. Sep 61, 34p
Contract AT(29-1)789
OTS $3.60

Includes Appendices A through C

AD-288 896
Stanford Electronics Labs., Stanford Univ., Calif.
NATURAL FREQUENCIES OF TUNNEL DIODES WITH PARASITICS
B. S. Golosman and R. W. Newcomb. May 62, 21p
Contract Nonr-225(24)
Technical rept. no. 2250-2; SEL-62-060
OTS $2.60

DESCRIPTORS: *Semiconductor devices, *Diodes (Semiconductor), *Tunnel diodes, *Circuits, Frequency,

The regions of allowed natural frequencies in Re $P \geq 0$ are determined for two different circuits which correspond to linearized equivalent circuits for tunnel diodes. Passive networks to obtain any possible natural frequency are given. Multiple-diode circuits are treated, and for identical diodes it is shown that the best results occur with two diodes. (Author)

AD-299 126
Temco Electronics Div., Temco Electronics and Missiles Co., Dallas, Tex.
SCR POWER INVERTER STUDY. Quarterly progress rept. no. 3, 1 Jan-30 Sep 62
G. P. Underbrink. 10 Nov 62, 70p
Contract DA36-039-sc-88965
Rept. 6017.05
OTS $6.60

DESCRIPTORS: *Inverters, *Inverter circuits, *Commutators, Generators, Oscillators, Circuits, Rectifiers, Circuit breakers, Phase shifters.

System analysis and design concepts of a typical 2-kva, 28v-115v, 3/1-phase, active-commutated, duty cycle regulated, SCR power inverter are presented. Final auxiliary circuits (such as oscillator, ring counter-phase splitter, magnetic regulator-transducer, electronic circuit breaker, and control single-to-three phase changeover) are described as well as circuit developments which were proven unsatisfactory for the inverter requirements. Recommendations are made to improve SCR inverter techniques and an alternate method is proposed for low-voltage, high-kva SCR power conversion. (Author)
(See also AD-282 985)

Mechanical Engineering

AD-422 073
Battelle Memorial Inst., Columbus, Ohio.
CONTROL OF CORROSION AND DEPOSITS IN STATIONARY BOILERS BURNING RESIDUAL FUEL OIL.
State-of-the-art rept.
P. D. Miller, C. J. Slunder, H. H. Krause, and F. W. Fink. 1 May 63, 146p
[Contract NBy-37627]
OTS $11.00

DESCRIPTORS: *Boilers, *Corrosion inhibition, *Combustion, Fuel oil, Reviews, Patents,

Contents:
Flue-gas condensate corrosion in the low-temperature zones of the boiler (Corrosion in low-temperature zones, Control of corrosion, Combustion control, Construction materials and protective coatings);
Chemistry of burning residual fuel oil and oil-ash deposits (Characteristics of residual fuel oil, Troublesome elements in oil-ash, High-temperature oil-ash deposits);
High-temperature corrosion reactions (Oxidation of metals, Corrosion by oil ash); and
Control of boiler deposits and corrosion (Methods of control by additives, Fuel pretreatments at the boiler plant). Included are 226 references.

PB-181 121 Rev. 2
Bureau of Yards and Docks, Washington, D. C.
HEATING, COOLING, VENTILATING HANDBOOK.
Engineered Performance Standards, Public Works Maintenance Nov 63, 146p
NAVDOCKS P-704.0, supersedes rept. dated Sep 62
OTS $2.75

DESCRIPTORS: *Handbooks, *Maintenance, *Heaters, *Cooling and ventilating equipment, *Job analysis,

PB-181 122 Rev. 3
Bureau of Yards and Docks, Washington, D. C.
HEATING, COOLING, VENTILATING FORMULAS. Engineered Performance Standards, Public Works Maintenance Nov 63, 31p
NAVDOCKS P-704-1, supersedes rept. dated Sep 62
OTS $1.00

DESCRIPTORS: *Mechanical engineering, *Handbooks, *Heating plants, *Refrigeration systems, *Ventilation, Maintenance, *Job analysis.

PB-181 603
Pope, Evans and Robbins, New York,
PACKAGE COAL-FIRED BOILERPLANT 40,000 LBS. PER HR. CAPACITY BELOW GROUND COAL STORAGE VERSION. [1963] 138p
[Contract OCR14-01-0001-242]
Office of Coal Research Specification no. OCR-40
OTS $7.00

DESCRIPTORS: *Power plants (Establishments), Automatic, *Steam power plants, *Boilers, Design, Specifications, Coal, Storage, *Tanks (Containers), Conveyors, Underground structures,

Specification are given for a coal-fired boiler plant, of 40,000 lbs./hr. capacity, along with auxiliary equipment and structures. Coal storage is in the form of an 160 ton coal tank, with a system for automatically transferring coal to the stokers and removing ashes to an ash silo. The plant is designed to operate automatically with intermittent attendance by one operator. (See also PB-181 604)

PB-181 604
Pope, Evans and Robbins, New York.
PACKAGE COAL-FIRED BOILERPLANT 40,000 LBS. PER HR. CAPACITY ABOVE GROUND COAL STORAGE VERSION. [1963] 140p
[Contract OCR14-01-0001-242]
Office of Coal Research Specification no. OCR-40A
OTS $7.00

DESCRIPTORS: *Power plants (Establishments), Automatic, *Steam power plants, *Boilers, Design, Specifications, Coal, Storage, *Tanks (Containers), Conveyors,

Specifications are given for a coal-fired boiler plant, of 40,000 lbs./hr. capacity, along with auxiliary equipment and structures. Coal storage is in the form of a combination coal and ash storage silo with a capacity of approximately 185 tons of coal and 12 tons of ash. Coal transfer to the stoker hoppers and ash removal to the silo ash compartment is automatic. The plant is designed to operate with intermittent attendance by one operator. (See also PB-181 603)

Ordnance, Missiles, and Satellite Vehicles

NASA-TN-D-2134
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
THE USE OF A TWO-DEGREES-OF-FREEDOM GYROSCOPE AS A SATELLITE YAW SENSOR
Francis J. Moran. Feb 64, 39p
N64-14940
OTS $1.00

NASA-CR-39
Boeing Co., Seattle, Wash.
INITIAL CONCEPT OF LUNAR EXPLORATION SYSTEMS FOR APOLLO..VOLUME V - SUMMARY DIGEST
Mar 64, 34p
Contract NASw-792
N64-15969
OTS $1.00

NASA-TN-D-2103
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
THE DRIFT OF A 24-HOUR EQUATORIAL SATELLITE DUE TO AN EARTH GRAVITY FIELD THROUGH 4TH ORDER
C. A. Wagner. Feb 64, 37p
N64-15907
OTS $1.00

NASA-TN-D-2099
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
ENVIRONMENTAL TEST PROGRAM FOR ARIEL I
Warner H. Hord, Jr. Feb 64, 69p
N64-15220
OTS $1.75

NASA-TN-D-2107
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
THE ROCKET-GRENADE EXPERIMENT
W. Nordberg and W. Smith. Mar 64, 37p
N64-16317
OTS $1.00

AD-42? 941
Institute [for Aerospace Studies] Univ. of Toronto (Canada)
ATTITUDE STABILITY OF ARTICULATED GRAVITY-ORIENTED SATELLITES. PART II - LATERAL MOTION
H. Maeda. Jun 63, 49p
Grant AF-AFOSR-222-63
UTIA rept. no. 93; N64-13112
OTS $4.60

DESCRIPTORS: *Satellite attitude, *Stabilization systems, *Yaw, *Equations of motion, Damping, Gravity, Numerical analysis, Mechanics, *Satellites (Artificial).

By a procedure similar in principle to that for the longitudinal equations of motion, the lateral equations of a specific compound satellite system were derived. The system is substantially identical with that of the previous report (Part I) (AD-299 840). As a result of of linearization for small perturbations, the effect of orbit ellipticity vanishes in the lateral motion. Both the general case, i.e. with hinged yaw-stabilizers, and a simpler case, i.e. with fixed yaw-stabilizers, are discussed. The latter is considered to be better from the practical standpoint. After calculating numerical examples, the configuration was found to provide damping of the lateral motion to 1/2 amplitude in about 0.28 orbits, which is a little better than was previously found for the longitudinal modes.

N64-14893
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EARTH-VENUS TRAJECTORIES, 1970, VOLUME 5, PART B
V. C. Clarke, Jr., R. Y. Roth, W. E. Bollman, T. W. Hamilton, and C. G. Pfeiffer. 1 Oct 63, 792p
Contract NAS7-100
Technical memo no. 33-99; NASA CR-53050
OTS $31.00

N64-15553
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-24, VOLUME III FOR THE PERIOD SEPTEMBER 1, 1963 TO OCTOBER 31, 1963. DEEP SPACE INSTRUMENTATION FACILITY. 30 Nov 63, 107p
Contract NAS7-100
NASA CR-55419
OTS $9.10

N64-14845
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
TELECOMMUNICATION ASPECTS OF A MANNED MARS MISSION
W. K. Victor, R. Titsworth, and E. Rechtin.
20 Aug 63, 16p
Contract NAS7-100
Technical rept. no. 32-501; NASA CR-53047
OTS $1.60

NASA-TN-D-2027
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
CHARACTERISTICS OF A LUNAR LANDING CONFIGURATION HAVING VARIOUS MULTIPLE-LEG LANDING-GEAR ARRANGEMENTS
Ulysse J. Blanchard. Jan 64, 46p
N64-14981
OTS $1.25

NASA-TR-R-187
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
FLUID OSCILLATIONS IN THE CONTAINERS OF A SPACE VEHICLE AND THEIR INFLUENCE UPON STABILITY
Helmut F. Bauer. Feb 64, 149p
N64-14941
OTS $3.00

PB-163 743
Meteorological Satellite Lab., Weather Bureau, Washington, D. C.
ON THE USE OF REDUNDANCY IN THE DESIGN OF OPERATIONAL SATELLITES
S. Fred Singer, Apr 63, 11p
Rept. no. 17
OTS $1.60

DESCRIPTORS: *Satellites (Artificial), Redundant components, Reliability (Electronics), Operation, Costs, Optimalization, Analysis,

An operational analysis is performed on how best to use redundancy of subsystems in order to maximize the operating life of a satellite and thus reduce the annual operating cost. It is important to distinguish two extreme classes of subsystems; according to whether they deteriorate by: (A) operation; or (B) exposure to space environment. Class (B) items should be eliminated from the design of an operational spacecraft. If this is possible, then optimizing procedures can be stated quite directly. With Class B items present, more attention must be given to details, particularly weight trade offs. (Author)

PB-165 145
Naval Research Lab., Washington, D. C.
UPPER ATMOSPHERE RESEARCH REPORT NO. XXV. AEROBEE-HI REPORT NO. 2, THE NRL-37 FIRING. Interim rept.
E. C. Pressly and J. W. Townsend, Jr. 6 Apr 56, 17p
NRL rept. 4727
OTS $1.60

DESCRIPTORS: Rockets, *Sounding rockets, *Rocket components, *Upper atmosphere.

Aerobee NRL-37 was launched at the White Sands Proving Ground at 0600 MST on 25 August 1955. This flight was the first prototype test firing of the Navy Aerobee-Hi rocket. The major advance of this model over all earlier Aerobees and Aerobee-Hi's is the inclusion of a chemical gas pressurization system. The result of this change is that, for a nominal payload of 150 pounds, the Navy Aerobee-Hi is theoretically capable of reaching an altitude of 180 miles as compared to the 135 miles for the Air Force Aerobee-Hi, which is gas pressurized in the conventional Aerobee manner. Instrumentation was designed primarily to test rocket performance. In addition, there were Pirani pressure gages, the nose cone was polished for a check on meteor particles, and there was a test of the new beacon cutoff strip. The total payload amounted to 146.75 pounds. Because of a failure in the regulator system, the rocket engine did not ignite. Boster performance was normal - carrying the rocket up about 2 miles. Both rocket and booster impacted just north of the firing area. (Author)
(See also PB-119 145)

PB-165 146
Naval Research Lab., Washington, D. C.
UPPER ATMOSPHERE RESEARCH REPORT NO. XXVI. AEROBEE-HI REPORT NO. 3, THE NRL-38 FIRING. Interim rept.
E. C. Pressly and J. W. Townsend, Jr. 6 Jun 56, 20p
NRL rept. 4757
OTS $1.60

DESCRIPTORS: Rockets, *Sounding rockets, *Rocket components, *Upper atmosphere.

Aerobee NRL-38, the second prototype Navy Aerobee-Hi rocket, was launched at the White Sands Proving Ground on 9 December 1955. The flight was a complete failure due to a hard start which occured in the sustainer engine at takeoff. The rocket exploded just as it left the launching tower and fell into the firing area compound. As a result of this failure, which was the second in a row with the Navy Aerobee-Hi, the entire rocket system will be carefully evaluated before the next flights scheduled in May 1956. (Author) (See also PB-165 145)

PB-165 147
Naval Research Lab., Washington, D. C.
UPPER ATMOSPHERE RESEARCH REPORT NO. XXVII. AEROBEE-HI REPORT NO. 4, THE NRL-39, NRL-42, NRL-46, AND NRL-50 FIRINGS. Interim rept.
E. C. Pressly and J. W. Townsend, Jr. 12 Mar 57, 36p
NRL rept. 4899
OTS $3.60

DESCRIPTORS: Rockets, *Sounding rockets, *Rocket components, *Upper atmosphere.

Aerobee-Hi rockets NRL-39, 42, 46, and 50 were fired from the WSPG during May and June 1956 as a part of the Aerobee-Hi development program. Aerobee-Hi's NRL-39 and NRL-42 were instrumented to obtain rocket performance data. NRL-39 was a complete failure due to range safety circuitry difficulties. NRL-42 reached a peak altitude of 117 miles; however, there was a thrust chamber failure at 46 seconds which prevented the rocket from reaching its predicted altitude of 190 miles. NRL-46, which was instrumented with a sun-following spectrograph, also burned out early due to thrust chamber failure and only reached an altitude of 36 miles. NRL-50, instrumented with an ionosphere experiment, was a complete success, reaching a peak of 164 miles. This rocket set a new altitude record for American-built boosted rockets, and also demonstrated that high burnout altitudes are feasible with fin stabilized rockets. (Author) (See also PB-165 146)

PB-165 148
Naval Research Lab., Washington, D. C.
UPPER ATMOSPHERE RESEARCH REPORT NO. XXXI. AEROBEE-HI REPORT NUMBER 5, THE NRL-45, NRL-47, NRL-43, NRL-48, NRL-40, NRL-41, AND NRL-44 FIRINGS. Interim rept.
E. C. Pressly and J. W. Townsend, Jr. 6 Feb 58, 45p
NRL rept. 5076
OTS $4.60

DESCRIPTORS: Rockets, *Sounding rockets, *Rocket components, *Upper atmosphere.

The Navy Aerobee-Hi development program was brought to a close during 1956 and 1957 with the firings of NRL-45, -47, -43, and -48 at Fort Churchill, Manitoba, Canada, and of NRL-40, -41, and -44 at White Sands Proving Ground, New Mexico, Aerobee-Hi NRL-45 exploded in the tower while being held under full pressure pending the presence of an aurora overhead. Aerobee-Hi NRL-47 was partially successful, reaching an altitude of 74 miles. Aerobee-Hi NRL-43 was a good flight with a peak altitude of 121 miles. Aerobee-Hi NRL-48 was highly successful, the peak altitude being 155 miles. Aerobee-Hi NRL-40 reached an altitude of 127 miles, which was less than predicted. Aerobee-Hi NRL-41 reached a record altitude of 180 miles. Aerobee-Hi NRL-44 was successful, achieving the predicted altitude of 126 miles. These tests have proved the feasibility of the RV-N-13c, Navy Aerobee-Hi, design and have shown that the upper air scientists who are to use this vehicle extensively during IGY will have a rocket which meets all of the principal specifications set for it at the beginning of the development program in 1953. (Author) (See also PB-165 147)

PB-165 149
Naval Research Lab., Washington, D. C.
UPPER ATMOSPHERE RESEARCH REPORT NO. XXXI. AEROBEE-HI REPORT NUMBER 5, THE NRL-45, NRL-47, NRL-43, NRL-48, NRL-40, NRL-41, AND NRL-44 FIRINGS. Interim rept.
E. C. Pressly and J. W. Townsend, Jr. 26 Jun 58, 8p
NRL rept. 5076 (Addendum)
OTS $1.10

DESCRIPTORS: Rockets, *Sounding rockets, *Upper atmosphere, Pressure

The Navy Aerobee-Hi development program was brought to a close during 1956 and 1957 with the firings of NRL-45, -47, -43, and -48 at Fort Churchill, Manitoba, Canada, and of NRL-40, -41, and -44 at White Sands Proving Ground, New Mexico. Aerobee-Hi NRL-45 exploded in the tower while being held under full pressure pending the presence of an aurora overhead. Aerobee-Hi NRL-47 was partially successful, reaching an altitude of 74 miles. Aerobee-Hi NRL-43 was a good flight with a peak altitude of 121 miles. Aerobee-Hi NRL-48 was highly successful, the peak altitude being 155 miles. Aerobee-Hi NRL-40 reached an altitude of 127 miles, which was less than predicted. Aerobee-Hi NRL-41 reached a record altitude of 180 miles. Aerobee-Hi NRL-44 was successful, achieving the predicted altitude of 126 miles. These tests have proved the feasibility of the RV-N-13c, Navy Aerobee-Hi, design and have shown that the upper air scientists who are to use this vehicle extensively during IGY will have a rocket which meets all of the principal specifications set for it at the beginning of the development program in 1953. In the addendum, base pressures measured on flights of Navy Aerobee-Hi rockets NRL-40 and NRL-41 are compared with ambient atmospheric pressures and the inflight coefficient of drag on NRL-41 is presented. (Author) (See also PB-165 148)

AD-420 471
Naval Ordnance Lab., White Oak, Md.
USE OF RADIANT HEATING TECHNIQUES TO STUDY VULNERABILITY OF FIRE
C. V. Vickers, Jr. 24 Jul 63, 11p
NOLTR 63-174; N63-22240
OTS $0.50

DESCRIPTORS: *Ordnance, *Fires, Heating, High-temperature research, Test equipment, Electric furnaces.

A laboratory method of studying the performance of ordnance items under the vulnerability environment of fire is presented. This method makes use of radiant heating techniques. General information on instrumentation techniques, test equipment required and test procedure is included. Radiant heating tests provide a relatively safe, convenient method of studying the fire vulnerability of items. Results indicate that the effects of the high temperature environments produced by actual fire tests can be reproduced by radiant heating techniques. (Author)

NASA-TN-D-2142
New Mexico State Univ., University Park.
FIELD WIND WEIGHTING AND IMPACT PREDICTION FOR UNGUIDED ROCKETS
Keith E. Hennigh. Mar 64, 26p
Contract NAS5-1032
N64-15972
OTS $0.75

SCTM-354-61(25)
Sandia Corp., Albuquerque, N. Mex.
A NEW ROCKET LAUNCHING METHOD
G. Corry McDonald. Jan 62, 25p
Contract AT(29-1)789
OTS $2.60

DESCRIPTORS: *Rocket launchers

Sanitation and Safety Engineering

NASA-TN-D-2240
Lockheed-California Co., Burbank.
INVESTIGATION OF MECHANISMS OF POTENTIAL AIRCRAFT FUEL TANK VENT FIRES AND EXPLOSIONS CAUSED BY ATMOSPHERIC ELECTRICITY
Melvin Gerstein. Jan 64, 185p
Contract NASr-59
N64-15528
OTS $3.00

LADC-5343
Los Alamos Scientific Lab., N. Mex.
CURRENT PROBLEMS AND NEW DEVELOPMENTS IN RESPIRATORY PROTECTION
E. C. Hyatt. [1962] 42p
Contract W7405-eng-36
OTS $4.60

DESCRIPTORS: *Respirators, *Gas masks

ORNL-TM-612
Oak Ridge National Lab., Tenn.
THE AUDITING OF REACTOR SAFETY AT THE OAK RIDGE NATIONAL LABORATORY
Francois Kertesz. 8 Jul 63, 19p
Contract W7405-eng-26
OTS $1.60

DESCRIPTORS: *Reactor safety systems.

TID-17813
Union Carbide Nuclear Co., Oak Ridge, Tenn.
REVIEW OF FURNACE SAFETY PRACTICE
J. T. Blackmon, Jr. 25 Sep 62, 20p
Contract W7405-eng-26
OTS $1.60

DESCRIPTORS: Safety, *Furnaces.

Y-1401
Union Carbide Nuclear Co., Oak Ridge, Tenn.
Y-12 RADIATION SAFETY MANUAL
P. C. McRee, C. M. West, and J. D. McLendon, ed.
23 Jul 63, 115p
Contract W7405-eng-26
OTS $2.25

FOOD, HANDLING, AND PACKAGING EQUIPMENT

NAS-NRC-1100
Food and Nutrition Board, NAS-NRC, Washington, D. C.
EVALUATION OF PROTEIN QUALITY. REPORT OF AN INTERNATIONAL CONFERENCE. Mar 63, 83p
NAS-NRC $3.00

DESCRIPTORS: *Proteins, *Food, Chemical analysis, *Amino acids, Biological assay, *Nutrition, Stress (Physiology), Quantitative analysis, *Conferences.

Content:
Analytical methods for the determination of nitrogen and amino acids in foods; evaluation of protein quality of foods from their amino acid content; biological assay methods for protein evaluation; clinical methods for protein evaluation; serum amino acids and urinary sulfur/nitrogen ratios in the evaluation of protein quality; relationship of stress and physiological state to the biological evaluation of protein quality; summary and recommendations; glossary of terms used in protein quality evaluation.

NAS-NRC-1143
Food Protection Committee, NAS-NRC, Washington, D. C.
FOOD CHEMICALS CODEX, PART I. 1963, 129p
Grant PHS-EF 00222
NAS-NRC $25.00/set

DESCRIPTORS: *Food, Standards, *Quality control, Chemical analysis, *Additives, Test equipment, Biological assay, Chemical indicators, Solutions,

This first portion of the Food Chemicals Codex is the result of an effort to provide objective quality standards for food-grade chemicals. Heretofore there have been no published, organized, national standards for food-additive chemicals comparable to those which have long been available in the United States for drugs. The aim of the Codex is to define a substantial number of food-grade chemicals in terms of minimum identity and purity specifications based on the elements of saftey and good manufacturing practice. It is expected that these quality standards will be acceptable to food processors as procurement and acceptance specifications and to primary manufacturers of chemicals as release specifications and to primary manufacturers of chemicals as release specifications. It is hoped that they will be recognized in an appropriate manner by government food law enforcement agencies as adequate for defining food-grade chemicals. (Preface)

TID-19008
National Canners Association, Berkeley, Calif.
RADIOACTIVE TRACER TECHNIQUES FOR DETECTING AND MEASURING DETERGENT RESIDUE ON WASHED FOODS AND EVALUATION OF FOOD WASHING PRACTICES. Progress rept.
Walter A. Mercer. Nov 60, 48p
Contract AT(04-3)296
OTS $4.60

DESCRIPTORS: *Food, *Cleaning compounds,

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

SCTM-161-62(25)
Sandia Corp., Albuquerque, N. Mex.
NONMECHANICAL WORKHOLDING DEVICES
C. D. Henderson. Aug 62, 12p
Contract AT(29-1)789
OTS $1.60

TID-19009
Northwestern Technological Inst., Evanston, Ill.
A SYSTEM FOR EMPLOYING ULTRASONIC IMAGING TECHNIQUES FOR NONDESTRUCTIVE TESTING.
Final rept.
John E. Jacogs. 28 Jun 63, 25p
Contract W-31-109-eng-38
OTS $2.60

DESCRIPTORS: *Non-destructive testing, *Ultrasonic radiation, *Transducers.

Engines and Propulsion Systems

PB-165 194
Aerospace Corp., El Segundo, Calif.
ELECTRON BOMBARDMENT HEATING OF ELECTROTHERMAL PROPULSION. General research
K. E. Starner and W. R. Grabowsky. 3 Feb 64, 49p
Rept. no. ATN-64(9227)-3
OTS $4.60

DESCRIPTORS: Propulsion, *Electric propulsion, Electron bombardment, Heating, Effectiveness,

Electrothermal propulsion devices developed to date can be grouped into two classifications, namely, the arc jet and the electrical resistance heated heat transfer propulsor. The former type features Joule heating directly in the gas; in the latter, a resistance heated refractory metal heat exchanger transfers heat to the propellant by conduction. This report introduces the technique of high-voltage, low-current electron bombardment heating for the heat transfer thrustor. The electron bombardment approach is found to have inherent advantages for space applications and allows lifting of several restrictions found with resistance heating methods. A tantalum, electron bombardment type gas heater was built to research thrustor operation. Steady-state gas temperatures to 2700°K were produced with argon at a voltage-to-current ratio greater than 50. The device functioned successfully for a total operating time of approximately 50 hr. (Author)

NASA-TN-D-2253
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
ANALYTICAL EVALUATION OF POSSIBLE NONCRYOGENIC PROPELLANTS FOR ELECTROTHERMAL THRUSTORS
John W. Schaefer and John Ferrante. Mar 64, 24p
N64-16120
OTS $0.75

NASA-TN-D-1185
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
SOME THEORETICAL BASES FOR SELECTION OF MOLECULAR ION PROPELLANTS AND A SURVEY OF MOLECULAR PLASMA COLLISION PROCESSES
John V. Dugan, Jr. Feb 64, 46p
N64-15906
OTS $1.25

N64-14156
Minneapolis-Honeywell Regulator Co., Minn.
ROCKET BOOSTER CONTROL. SECTION 3: MODES OF FINITE RESPONSE TIME CONTROL
C. A. Harvey. 22 Nov 63, 15p
Contract NASw-563
MH MPG rept. 1541-TR-3; NASA CR-55345
OTS $1.60

N64-14154
Minneapolis-Honeywell Regulator Co., Minn.
ROCKET BOOSTER CONTROL: SECTION 5: TIME OPTIMAL CONTROL OF LINEAR RECURRENCE SYSTEMS
E. B. Lee. 18 Dec 63, 11p
Contract NASw-563
MH MPG rept. 1541-TR-5; NASA CR-55350
OTS $1.60

N64-15543
Minneapolis-Honeywell Regulator Co., Minn.
ROCKET BOOSTER CONTROL: SECTION 6. TIME-OPTIMAL BOUNDED PHASE COORDINATE CONTROL OF LINEAR RECURRENCE SYSTEMS
E. B. Lee. 26 Dec 63, 12p
Contract NASw-563
MH MPG rept. 1541-TR-6; NASA CR-55430
OTS $1.60

N64-15544
Minneapolis-Honeywell Regulator Co., Minn.
ROCKET BOOSTER CONTROL: SECTION 11. A NOTE ON SYSTEM TRUNCATION
E. R. Rang. 19 Nov 63, 19p
Contract NASw-563
MH MPG rept. 1541-TR-11; NASA CR-55567
OTS $1.60

N64-15545
Minneapolis-Honeywell Regulator Co., Minn.
ROCKET BOOSTER CONTROL, SECTION 16. AN ALTERNATE DERIVATION AND INTERPRETATION OF THE DRIFT-MINIMUM PRINCIPLE
C. A. Harvey. 22 Nov 63, 16p
Contract NASw-563
MH MPG rept. 1541-TR-15; NASA CR-55344
OTS $1.60

MATERIALS

TID-16252
Yale Univ., New Haven, Conn.
NOTES ON THE UNIFORMITY OF COMMERICAL FOILS
L. C. Becker, G. K. Tandon, F. C. Jobes, J. A. McIntyre, and T. L. Watts. 16 Jul 62, 20p
Contract AT(30-1)2726
OTS $1.60

DESCRIPTORS: *Aluminum, Nickel, *Films, *Silver.

Ceramics and Refractories

AD-420 193
Little (Arthur D.) Inc., Cambridge, Mass.
INVESTIGATION OF THE THERMAL PROPERTIES OF HIGH-TEMPERATURE INSULATION MATERIALS. Final rept. on The Chemistry and Physics of Materials; and Materials Application
Alfred E. Wechsler and Peter E. Glaser. Jul 63, 188p
Contract AF33(657)9172
ASD-TDR-63-574
OTS $3.00

DESCRIPTORS: *Thermal insulation, High-temperature research, *Graphite, Oxides, *Zirconium compounds, *Aluminum compounds, *Quartz, Carbides, *Silicon compounds, Foams,

In an effort to isolate the relative contribution of solid conduction and radiation in proposed insulation systems, two separate experiments were attempted. In the first, effective thermal conductivities of graphite and zirconia fibers were measured in the temperature range of -320 to 200°F. The results were compared with empirical and theoretical models of heat transfer in fibrous insulations. In the second experiment, measurements of visible and infrared transmission through insulation materials indicated that scattering is the principal mechanism of radiation attenuation. Scattering and absorption cross sections estimated from the transmission data are given and show little effect of insulation temperature. Based upon selection criteria, such as chemical, mechanical, and physical stability; small particle or fiber size; radiation attenuation capability; and commercial availability; graphite, zirconia, and microquartz fibers, alumina and silicon carbide foams, multilayer insulations, and other mate rials composite systems were chosen for thermal property tests. The effective thermal conductivities of evacuated insulation systems were measured in the temperature range from 60 to 4000°F. The stability of materials exposed to high temperature vacuum environment for up to 170 hours was studied. (Author)

Y-1450
Union Carbide Nuclear Co., Oak Ridge, Tenn.
A SURVEY OF HIGH COMPRESSIVE STRENGTH OXIDES AND CARBIDES
R. P. Levey, Jr. 26 Sep 63, 39p
Contract W7405-eng-26
OTS $1.00

Fuels, Lubricants, and Hydraulic Fluids

NASA-TN-D-2169
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
EFFECT OF INTERCHANGING PROPELLANTS ON ROCKET COMBUSTOR PERFORMANCE WITH COAXIAL INJECTION
Martin Hersch. Feb 64, 23p
N64-14986
OTS $0.75

AD-277 397
Monsanto Research Corp., Everett, Mass.
EVALUATION OF HYDROCARBONS FOR HIGH TEMPERATURE FUELS. PART II. FUEL EVALUATION OF PROPERTY CORRELATION. VOLUME I. CORRELATION STUDIES, THERMAL STABILITY, AND CONTAMINANT EFFECTS. Final rept. for 25 Apr 58-14 Nov 61, on Aviation Fuels
J. O. Smith, B. M. Fabuss and others. Feb 62, 275p
Contract AF33(616)5799
WADC TR-59-327
OTS $17.50

DESCRIPTORS: *Bibliographies, *Jet engine fuels, *Fuels, *Hydrocarbons, *Aviation fuels, Combustion, Temperature, Stability, Decomposition, Pyrolysis, Methanes, Cyclohexanes, Impurities, Oxygen, Peroxides, Mercaptans, Sulfides, Chemical properties, Mechanical properties, Chemical analysis, Calorimeters, Reaction kinetics

Evaluation and correlation of hydrocarbon properties; The best compromise fuels were the members of the cyclohexane group with up to 4°C atom substituents in a chain or 3 substituents on the ring. Good thermal stability (710 to 788°F) was obtained, and their heat of combustion of 18,650 Btu/lb was second only to alkanes. Thermal stability studies: Decomposition and particle formation in 15 selected hydrocarbons was investigated in both static and dynamic test conditions at 800, and at 1000 to 1100°F, respectively. Contaminant effects: Treatment of hydrocarbons with 0 at near ambient temperature prior to pyrolysis had a negligible effect on the thermal stability. Above 250 to 300°F, contracting hydrocarbons with 0 decreased their thermal stability toward particle formation. Some S-containing contaminants inhibited the decomposition of cetane and decalin, and promoted the decomposition of n-propyl nonane. Highly napthenic fuels appear promising. (See also PB-160 732-4)

PB-165 172
Purolator Products, Inc. [Rahway, N. J.]
A GENERAL STUDY OF DIVERSE FILTRATION PHENOMENA WITH POSSIBLE APPLICATIONS TO AIRCRAFT FUEL FILTRATION
Richard G. Seed and Arthur A. Fowle. Nov 52, 58p
Contract AF33(616)129
WADC Technical rept. 54-181; AD-33 464
OTS $5.60

DESCRIPTORS: *Aviation fuels, *Fuel filters, *Jet engine fuels, Purification,

Leather and Textiles

PB-165 186
Army [Missile Command] Redstone Arsenal, Huntsville, Ala.
ANTI-STATIC TREATMENT OF LINT FREE FABRICS
T. J. Carter. 2 Apr 59, 12p
Rept. no. DSN-TN-9-59
OTS $1.60

DESCRIPTORS: *Clothing, *Textiles, *Dacron, Additives, Static electricity, Inhibition,

The material which showed the best combined lint-free and anti-static properties after treatment was dacron. Therefore, it is recommended that garments of Aston 108-treated dacron be used for personnel where lint control is desired and where flammable vapors are involved. The treatment will withstand at least five launderings, but probably should be re-applied after ten launderings. Cotton duck laboratory coats release considerable lint and should not be worn in ultra-clean work areas. (Author)

AD-426 891
Army Natick Labs., Mass.
BEHAVIOR OF LIQUIDS ON VARIOUS CORDS FOR SEAMS OF CHEMICAL AND BIOLOGICAL PROTECTIVE OVERGARMENTS
Pauline P. Hall. Oct 63, 27p
Textile series rept. no. 127
OTS $0.75

DESCRIPTORS: *Protective clothing, *Absorption (Physical), *Moistureproofing, Impregnation, Fibers, Chemisorption.

Previous researchers have reported the behavior of liquid migration on and through textile assemblies. This study is the first known attempt to test seams for liquid penetration by various chemicals (important for developing chemical and biological protective overgarments) and to develop an LSc type seam with a superimposed cord to help resist this penetration. The results show that liquid behavior on seams differs among chemicals as well as among cords. The optimum protection for a seam may vary from one chemical to another.

Plastics

AD-286 459
Massachusetts Inst. of Tech., Cambridge.
INVESTIGATION OF MECHANICS OF REINFORCED PLASTICS. Rept. for 1 Mar-30 Sep 59
Yehuda Stavsky and Frederick J. McGarry. Jun 62, 141p
Contract AF33(616)6280
WADD-TR-60-746
OTS $11.00

DESCRIPTORS: *Laminated plastics, Mechanical properties, Stresses, Deformation, Elasticity, *Composite materials, *Reinforcing materials, *Glass textiles, Fracture (Mechanics),

A theory for the small bending and stretching of alminated aeolotropic plates had been developed from which two important effects have been found: bending and stretching are, generally, coupled and a cross-elasticity phenomenon occurs in the stress-resultants and couples relations. Some simple boundary value problems for rectangular plates were treated with the general eighth order system in cases where the bending-stretching coupling disappears and where both the bending-stretching and cross-elasticity effects vanish; this revealed that homogeneous plate theory can be used to analyze such special cases. A second theory was established for the small bending of symmetrically laminated isotropic plates where transverse shear and normal stress deformations are taken into account. With the added assumption of a constant Poisson's ratio, the theory results in a sixth order system of differential equations with three boundary conditions. If Poisson's ratio is not constant, a tenth order system with five boundary conditions results. The basic features of the latter have no counterpart in the theory of homogeneous plates and shells. The second and experimental phase of this study investigated resin shrinkage effects on single filaments and on fabric-based laminates. (Author)

Rubber and Elastomers

AD-420 418
Rock Island Arsenal Lab., Ill.
SIX YEAR INDOOR AND OUTDOOR AGING OF ELASTOMERIC VULCANIZATES
E. W. Bergstrom. 16 Jul 63, 32p
Rept. no. 63-2392
OTS $1.00

DESCRIPTORS: *Vulcanizates, *Elastomers, Aging (Materials)

SBR, NR and NBR vulcanizates employing sulfur-accelerator, accelerator only and peroxide curing systems were aged indoors and outdoors for a period of six years. Properties were determined at intervals of six months, one, two, four and six years. The value of including an antioxidant to improve aging was found to vary with the type of curing system. The nature of the curing system had a decided effect on aging, expecially outdoors. In most cases the vulcanizates aged more outdoors than indoors. In a few instances they aged almost as well outdoors as indoors. The low temperature flexibility remained virtually unchanged after six years indoors or outdoors. (Author)

MATHEMATICS

ANL-6794
Argonne National Lab., Ill.
A LABORATORY INVESTIGATION OF THE LAGRANGIAN AUTOCORRELATION FUNCTION IN A STRATIFIED FLUID
Paul Frenzen, Doctoral thesis. Nov 63, 185p
Contract W31-109-eng-38
OTS $2.75

TID-17814
Knolls Atomic Power Lab., Schenectady, N. Y.
DISTRIBUTION USEFUL IN TESTING FOR RANDOMNESS IN A TWO OR MULTI-PHASE STRUCTURE
G. L. Burrows. 1963, 21p
Contract W31-109-eng-52
OTS $2.60

DESCRIPTORS: Mixtures, *Statistical tests, *Powders,

PB-165 161
Naval Ordnance Test Station, China Lake, Calif.
A METHOD OF LEAST SQUARES CURVE FITTING WITH ERROR IN BOTH VARIABLES
Frank C. Reed. Jun 55, 18p
NOTS 1154; NAVORD rept. 3521; AD-74-678
OTS $1.60

DESCRIPTORS: Ballistics, Data, *Least squares method, *Curve fitting, Errors.

A method, initially developed by Deming (Phil. Mag. Series 7, v. 11), is presented for fitting curves by least-squares methods to data subject to errors in more than 1 variable. The method is illustrated by discussing the problem of fitting a line, $y = a + bx$, and a 4th degree curve, $y = a + bx + cx^2 + dx^3 + ex^4$, to data subject to error in 2 variables. (DDC abstract)

PB 165 191
Stanford Electronics Labs., Stanford Univ., Calif.
LINEAR ESTIMATION OF SAMPLED STOCHASTIC PROCESSES WITH RANDOM PARAMETERS
H. E. Rauch. Apr 62, 95p
Contract Nonr-225(24)
Technical rept. no. 2108-1; SEL-62-058
OTS $8.60

DESCRIPTORS: *Mathematical prediction, *Stochastic processes, *Statistical functions, Linear systems, Dynamics, Mathematical models, Differential equations, Numerical methods and procedures

The general solution is derived for the problem of the optimum linear estimation of a sampled stochastic process with random parameters that can be adequately approximated by mathematical models. The random parameters are independent from one sample point to the next with known mean and covariance. The solution can be implemented by a linear dynamic system with a matrix-valued gain (or gains) calculated iteratively for each sample point. For high-order complex systems these computations are most easily performed by a digital computer. (Author)

Computing Devices

AD-280 258
Columbia Univ., New York. School of Engineering.
THE OPTIMUM CONTROL OF CROSS-COUPLED SYSTEM. Technical rept. no. 75
Paul A. Meschler. 1 Mar 62, 32p
Contract AF49(638)998
Rept. no. CU-8-62-AF-998-EE; AFOSR-2312; N62-11480
OTS $3.60

DESCRIPTORS: *Control theory, *Correlation techniques, Feedback, *Servomechanisms, Vehicles, Trajectories, Guidance, Calculus of variations,

The purpose of this paper is to develop a design technique for a cross-coupled controller, once the total system (both vehicles) has reached the initial point on the trajectory. Requirements on the controller are: (1) It must maintain the total system on the trajectory, and (2) it must cause the total system to traverse the distance from some initial to final point on the trajectory in the least possible time while keeping within the constraints on the control variables. (Author)

TID-17810
Digital Computer Lab., Univ. of Illinois, Urbana.
HIGH-SPEED COMPUTER PROGRAM, PART I. CIRCUIT RESEARCH PROGRAM, PART II. SWITCHING THEORY, PART III. MATHEMATICAL METHODS, PART IV. DATA REDUCTION METHODS, PART V. ILLIAC USE AND OPERATION, PART VI. IBM 7090-1401 SYSTEM, PART VII. INSTRUCTIONAL USE OF THE IBM 7090-1401 SYSTEM, PART VIII. CONTROL DATA CORPORATION 1640, PART IX. GENERAL LABORATORY INFORMATION, PART X. Technical progress rept. Nov 62, 67p
Contract AT(11-1)415
OTS $6.60

DESCRIPTORS: *Computers

TID-18948
Digital Computer Lab., Univ. of Illinois Urbana.
HIGH-SPEED COMPUTER PROGRAM, PART I. ILLIAC II SYSTEMS PROGRAMMING AND OPERATION, PART II. CIRCUIT RESEARCH PROGRAM, PART III. MATHEMATICAL METHODS, PART IV. DATA REDUCTION METHODS, PART V. IBM 7090-1401 SYSTEM, PART VI. GENERAL LABORATORY INFORMATION, PART VII. Technical progress rept. Apr 63, 55p
Contract AT(11-1)415
OTS $5.60

DESCRIPTORS: *Computers, *Transistors, Programming (Computers).

XDC-61-5-2
General Electric Co., Cincinnati, Ohio.
SCRAMBLE FOR SIMULATION OF PERIPHERAL EQUIPMENT ON THE IBM 1401
David S. Latimore. Jan 61, 45p
Contracts AF33(600)38062 and AT(11-1)171
OTS $4.60

DESCRIPTORS: *Programming (Computers)

PB-165 173
Harvard Univ., Cambridge, Mass.
ADVANCED DIGITAL COMPUTER LOGIC
H. Aiken and W. Semon. Jul 59, 138p
WADC TR-59-472; AD-230 618
OTS $10.50

DESCRIPTORS: *Digital computers, *Computer logic, Number theory, Algebra.

A number system, referred to as the modular number system, is described. Many features of the modular system are of considerable significance to digital computer technology, especially to mechanization in computing equipment. The system requires no carries as in the decimal system, and multiplication can be accomplished in the same time as addition and subtraction. The modular number system lends itself especially toward mechanization by means of magnetic core logic and solid state components. Several problem areas remain, and are described in detail. The results obtained are described, and problem areas remaining for further research are outlined. (Author)

KAPL-M-RFS-3
Knolls Atomic Power Lab., Schenectady, N. Y.
THE DIODE DIVIDER IN AN ANALOG DIVIDER, MULTIPLIER AND SQUARE-ROOT EXTRACTOR
R. F. Shea. 9 Nov 62, 26p
Contract W31-109-eng-52
OTS. $2.60

DESCRIPTORS: *Diodes, Fluid flow, *Semiconductors,

AD-288 807
Stanford Electronics Labs., Stanford Univ., Calif.
AN INVARIANT INPUT FOR A PATTERN-RECOGNITION MACHINE
G. H. Ball. Apr 62, 141p
Contract Nonr-225(24)
Technical rept. no. 2003-4; SEL-62-051
OTS $11.00

DESCRIPTORS: *Reading machines, *Pattern recognition, Statistical analysis, Probability, Geometry, Integrals, Computers,

In this paper information extracted from a visual pattern by the receptor is required to be invariant with respect to the rotation and the translation (and at times, scale changes) of the pattern. Numerical parameters are obtained from the pattern that correspond to the "shape" of the pattern. Integral geometry is employed to obtain these invariant parameters. Probabilities of misclassification are found as a function of the number of pattern measurements that are used to estimate a parameter. The numerical values of some parameters are obtained for the set of patterns consisting of circles, squares, rectangles, ellipses, and right isosceles triangles. Decision theory is used to obtain the structure of the test having minimum probability of error (under certain constraints). Majority voting is discussed as a means of combining the results of many "tests" on a pattern, and two electronic devices, which may be useful in the actual implementation of the procedure given, are exhibited. (Author)

AD-402 104
Stanford Electronics Labs., Stanford Univ., Calif.
LEARNING TO RECOGNIZE PATTERNS IN A RANDOM ENVIRONMENT
N. Abramson and D. Braverman (California Inst. of Tech.). May 62, 19p
Contract Nonr-225(24)
Technical rept. no. 2003-5; SEL-62-071
OTS $1.60

DESCRIPTORS: *Pattern recognition, *Probability, *Learning, Measure theory, Computers, Mathematical models, Mathematical logic, Correlation techniques, Artificial intelligence,

This paper deals with the optimal use of a sequence of prior observations in order to recognize patterns. The class of pattern recognition problems which we treat is completely general in that the results may be applied to patterns of a visual, aural or electromagnetic origin. We show that the use of prior observations for pattern recognition may be described as a process of learning the statistical characteristics of the patterns involved. The mathematical description of the learning process is analyzed in order to obtain optimum (i.e., minimum probability of error) solutions to various types of pattern recognition problems. These solutions to the mathematical problem are then interpreted in terms of the systems implementation they imply. The optimum systems are shown to consist of banks of generalized correlators. Under assumption of independent measurements, the optimum systems reduce to a class of systems which function by reinforcing desired responses. (Author)

PB-165 180
Statistical Techniques Research Group, Princeton Univ., N. J.
A METHOD OF SOLVING LINEAR PROGRAMMING PROBLEMS WHEN SOME BUT NOT ALL OF THE VARIABLES MUST TAKE INTEGRAL VALUES.
Technical rept. no. 19
E. M. L. Beale. Jul 58, 24p
Contract DA36-034-ORD-2297
[Rept. no. 1715:17]; AD-200 732
OTS $2.60

DESCRIPTORS: *Linear programming, Algorithms.

A method of solving linear programming problems when some but not all of the variables must take integral values is outlined, and illustrated by a numerical example. The method is based on Gomory's in press algorithm for solving linear programming problems when all the variables must take integral values. (Author)

MECHANICS

PB-165 193
Aerospace Corp., El Segundo, Calif.
ON THE OSCILLATIONS OF A TURBULENT FLOW.
General Research
R. Betchov and W. O. Criminale (Princeton Univ.)
27 Jan 64, 32p
Rept. no. ATN-64(9231)-1
OTS $3.60

DESCRIPTORS: *Turbulent flow, Oscillation, Turbulent boundary layer, Laminar flow, Viscosity, Velocity,

A turbulent boundary layer is assimilated to a laminar layer of large and variable viscosity. This viscosity represents the eddy viscosity. A stability analysis is performed for small perturbations by the use of a digital computer. It is found that a typical turbulent layer is stable, even if the eddy viscosity vanishes at the wall. However if the mean velocity profile has a weak inflection near the outer edge, instabilities do occur. Various observations of the intermittent part of the layer suggest the existence of such inflections and lead to acceptable values of the wavelengths and phase velocities. It is also found that the laminar sublayer has a negligible effect on this type of oscillation. (Author)

PB-165 176
Brown Univ., Providence, R. I.
SMALL OSCILLATIONS OF BODIES OF REVOLUTION IN A VISCOUS FLUID. Technical rept. no. 2
Joseph Kestin and Leif N. Persen. Oct 54, 59p
Contract AF18(600)891
[AF]OSR TN-54-326; AD-48 559
OTS $5.60

DESCRIPTORS: *Fluid flow, Viscosity, *Bodies of revolution, *Oscillation, Partial differential equations, Integral transforms,

Solutions are presented of the Navier-Stokes equations for oscillating bodies under the assumption that the body performs small oscillations in a viscous fluid under the influence of an elastic restoring force or couple. The particular cases studied include an infinite cylinder, a sphere, and a pile of disks. All of the problems are solved by the Laplace transform method, and the cases analyzed, as well as those previously discussed (AD-37 677), are summarized in one general equation. In all cases of practical importance the motion consists of a damped harmonic oscillation and a transient term whose importance is confined to the first few initial beats. The motion becomes isochronous with a logarithmic decrement. (DDC abstract)

PB-165 124
Graduate Aeronautical Labs., Calif. Inst. of Tech., Pasadena.
SOME NONLINEAR VIBRATION AND RESPONSE PROBLEMS OF CYLINDRICAL PANELS AND SHELLS
Rept. on Aeroelasticity and Structural Dynamics
Benjamin E. Cummings. Jun 62, 131p
Contract AF49(638)220
SM 62-32; AFOSR-3123; N62-14795
OTS $10.50

DESCRIPTORS: *Aeroelasticity, *Nonlinear systems, *Cylindrical bodies, *Structural shells, *Panels (Structural), *Vibration, Oscillation,

Large amplitude vibrations and forced responses of curved panels and shells are studied by the application of the shallow shell equation. The Galerkin procedure is used to reduce the nonlinear partial differential equations to ordinary nonlinear equations. Marked differences are found between the behavior of curved panels and cylindrical shells. Relations for the dependence of the free vibration period on amplitude are given. A two mode analysis of the cylindrical shell problem is included. The curved panel is found to exhibit a buckling phenomenon for the simple "breathing modes". Shock response methods are used to predict dynamic buckling of the curved panel and the predictions are verified by numerical integration. The cylindrical shell vibrations and responses are found to be governed by Duffing's equation and certain of the well-known properties of Duffing's equation are applied to the cylindrical shell dynamics. The two mode analysis of the cylindrical shell is shown to exhibit weak coupling, allowing the separate excitation of the coupled modes. Some numerical results are given. (Author)

PB-165 188
Institute of Metals and Explosives Research, Univ. of Utah, Salt Lake City.
FORMATION AND BEHAVIOR OF SHOCK WAVES IN SOLIDS. Technical rept.
R. B. Clay, M. A. Cook, and R. T. Keyes. 29 Jul 60, 52p
Contract NOrd-17371
AD-246 322
OTS $5.60

DESCRIPTORS: Shock waves, *Solids, Propagation, Photographic analysis, Elasticity, Plasticity, *Stresses, Explosives, Shear stresses, *Wave transmission, *Detonation waves.

A mechanism is proposed which relates the roles of elastic, plastic, unstable shock and stable shock waves in elastic-plastic solids. The model is based upon extending the equation for the longitudinal acoustic velocity for solids into the plastic region as portrayed by the stress-strain curves for the bulk and shear moduli. The explanation is qualitative but agrees in principle wi with experimental results observed. A study was made concerning some of the various effects of shocks passing through transparent solids. Explosives were the primary shock source, while the resulting shocks passing through the specimens were observed photographically by either a streak camera or a high speed framing camera. Specifically the transparent specimen was placed between the camera and an intense parallel or diffuse light source, and the change in index of refraction of the specimen by the shock produced recordable images. The results were of necessity rather qualitative. Nevertheless somewhat detailed studies were made concerning explosive end impulse, explosive lateral impulse, shock behavior at a free surface, shock behavior at a solid-solid interface, shock velocity attenuation and free surface velocities. (Author)

NASA-TR-R-190
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
THE INFLUENCE OF PREBUCKLING DEFORMATIONS AND STRESSES ON THE BUCKLING OF PERFECT CYLINDERS
Manuel Stein. Feb 64, 22p
N64-15405
OTS $0.50

NASA-TN-D-2088
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
CAVITATION AND EFFECTIVE LIQUID TENSION OF NITROGEN IN A TUNNEL VENTURI
Robert S. Ruggeri and Thomas F. Gelder. Feb 64, 35p
N64-15160
OTS $1.00

NASA-TN-D-2121
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
CORRELATION OF A TURBULENT AIR-BROMINE COAXIAL-FLOW EXPERIMENT
Robert G. Ragsdale, Herbert Weinstein, and Chester D. Lanzo. Feb 64, 35p
N64-15161
OTS $1.00

NASA-TN-D-2245
Michigan Univ., Ann Arbor.
FREQUENCIES AND MODES OF VIBRATION OF BUCKLERD CIRCULAR PLATES
B. Herzog and E. F. Masur. Feb 64, 33p
Grant NsG-132-61
N64-14987
OTS $1.00

PB-165 184
Pacific Missile Range, Point Mugu, Calif.
VIBRATIONS OF SKEW CANTILEVER PLATE
R. W. Claassen. 1 May 63, 39p
Technical rept. PMR-TR-62-1
OTS $3.60

DESCRIPTORS: *Cantilever beams, *Sheets, *Vibration, *Harmonic analysis, Functions, Matrix algebra, Programming languages.

The Ritz method is used to derive a solution for the frequencies of vibration and the corresponding nodal lines of a vibrating skew cantilever plate. This study is an extension of previously reported work (AD-283 308) in which the author, in collaboration with Dr. C. J. Thorne, investigated the vibrations of a rectangular cantilever plate. Some interesting phenomena, described were discovered after a large number of calculations had been made for the rectangular cantilevel plate. Similar phenomena were found for the skew cantilever plate. These phenomena appear when the values of two frequencies, varying as functions of the ratio of sides and/or the angle of skew, approach each other. Instead of crossing each other, these frequencies shy away from each other. At the same time, the nodal lines for these frequencies rotate so that each takes on the shape that the other had previously. (Author)

SCTM-80-63(72)
Sandia Lab., Albuquerque, N. Mex.
BALL-DROP SHOCK MACHINE
D. R. Schafer. May 63, 11p
Contract AT(29-1)789
OTS $1.60

Aerodynamics and Pneumatics

PB-165 185
Aerojet-General Corp., Azusa, Calif.
EXPERIMENTS ON POROUS-WALL COOLING AND FLOW-SEPARATION CONTROL IN A SUPERSONIC NOZZLE
L. Green, Jr. and K. L. Nall. Dec 58, 151p
Contract AF33(616)5552
Aerojet rept. no. 1490; WADC TN 58-348
OTS $11.50

DESCRIPTORS: *Fluid flow, Nitrogen, Injection, Boundary layer, *Nozzles, *Laval nozzles, Porous materials, *Jets, Schlieren photography, *Heat transfer, Cooling.

Control of flow separation by porous-wall injection at one boundary of a two dimensional, transparent-wall nozzle was studied by schlieren photography and static pressure measurements. Injection induced separation from the porous wall at near-optimum expansion ratios and thus effected controllable jet deflections. Temperature measurements at the porous wall confirmed the effectiveness of the transpiration cooling technique. (Author)

N64-13055
Alabama Univ. Research Inst., Huntsville.
HYPERSONIC FLOW WITH NON-EQUILIBRIUM DISSOCIATION AROUND BLUNT BODIES IN FLOW FACILITIES AND IN FREE FLIGHT. Research rept. no. 8
Rudolph Hermann and Janardanarao Yalamanchili (Doctoral thesis). Oct 63, 28p
Grant NsG-381
UARI Research rept. no. 8; NASA CR-55138
OTS $2.60

Presented at the Annual Meeting of the Wissenschaftliche Gesellschaft Fur Luft-Und Raumfahrt at Munich, Germany, October 8-12, 1963.

NASA-TN-D-2233
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
THE TOTAL ENTHALPY OF A ONE-DIMENSIONAL NOZZLE FLOW WITH VARIOUS GASES
Leland H. Jorgensen. Mar 64, 18p
N64-16119
OTS $0.50

AD-274 383
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
EXPERIENCE WITH AN OVEREXPANDED NOZZLE IN A LOW-DESNITY, HYPERVELOCITY WIND TUNNEL
J. Leith Potter and David E. Boylan. Apr 62, 16p
Contract AF40(600)800
Rept. no. AEDC TDR 62-85; N62-11414
OTS $1.60

DESCRIPTORS: *Hypersonic wind tunnels, Hypersonic nozzles, *Wind tunnel nozzles, Configuration, Superaerodynamics, Boundary layer, Pressure, Operation

Detailed measurements of static and impact pressures in the nozzle of a low-density wind tunnel are presented Purpose of the investigation was to determine the extent to which the nozzle of the Low-Density, Hypervelocity Tunnel may be used in an overexpanded mode of operation. Expansions to static pressures from one-fourth to one-fifth of the pressure outside the exit of the nozzle are shown to be feasible with the nozzle having a nominal Mach number of 10 and boundary-layer thickness appraoching nozzle radius at the exit. (Author)

PB-165 164
Arnold Engineering Development Center [Arnold Air Force Station] Tenn.
PHYSICAL ASPECTS OF THREE-DIMENSIONAL WAVE REFLECTIONS IN TRANSONIC WIND TUNNELS AT MACH NUMBER 1.20 (PERFORATED, SLOTTED AND COMBINED SLOTTED-PERFORATED WALLS)
B. H. Goethert. Mar 56, declassified, 59p
Contract AF40(600)620
AEDC-TR-55-45; AD-84 159
OTS $5.60

DESCRIPTORS: *Transonic wind tunnels, *Wind tunnels, Wind tunnel models, Shock waves, Mechanical waves, *Bodies of revolution,

The report presents a series of experimental and theoretical investigations associated with the testing of bodies of revolution in transonic test sections at a Mach number of 1.20. The cone-cylinder tests are a part of a systematic investigation of three-dimensional wave reflections in transonic wind tunnels. Both experiments and theory indicate that a differential-resistance type wall is required for interference-free flow. Test results for differential-resistance walls of both the pure perforated and the combination slotted-perforated type show that satisfactorily accurate data can be obtained for cone-cylinder models. It is theoretically shown that model configurations which are more smoothly curved than cone-cylinder models will be less critical with regard to wall interference in transonic testing. (Author)

AD-426 543(repriced)
Computer Engineering Associates, Inc., Pasadena, Calif.
LOW FREQUENCY INSTABILITIES OF FREE SYSTEMS. Final rept. for Mar 62-Aug 63
Robert G. Schwendler and Jack H. Hill. Nov 63, 129p
Contract AF33(657)8293
ASD-TDR-63-655; N64-13875
OTS $2.75

DESCRIPTORS: *Airframes, Stability, *Aeroelasticity, Mathematical prediction, Aerodynamic configurations, Structural shells, Fuselages, Conard configurations, Cylindrical bodies, Airfoils, Structural properties, Low frequency, Flutter

'Mode interaction' instabilities of aircraft were investigated. 'Mode interaction' refers to coupling between an elastic mode and a rigid body mode of the free system. Three rather general airframe configurations are analyzed in detail. It is shown that systems which tend toward steady state divergence are particularly susceptible to mode interaction. Also, that aerodynamic damping terms can have a destabilizing effect upon a free system. The analyses show that aeroelastic systems which possess no finite frequency elastic mode can be susceptible to a finite frequency instability. Computer studies of several different airframe configurations are discussed. An appendix contains stability charts for an aircraft having two rigid body modes and one elastic mode. (Author)

PB-165 076
Grumman Aircraft Engineering Corp., Bethpage, N. Y.
THEORETICAL PREDICTION OF PRESSURES IN HYPERSONIC FLOW WITH SPECIAL REFERENCE TO CONFIGURATIONS HAVING ATTACHED LEADING-EDGE SHOCK. PART II. EXPERIMENTAL PRESSURE MEASUREMENTS AT MACH 5 AND 8
Harold R. Mead and Frank Koch. May 62, 183p
Contract AF33(616)6400
ASD TR 61-60, Part II; N62-14727
OTS $13.00

DESCRIPTORS: *Hypersonic flow, *Pressure, *Wing-body configuration, Delta wings, Conical bodies, Model tests, Shock waves,

An analysis of the data is presented by comparison with the thin-shock-layer theory and the improved shock-expansion theory developed in the analytical program as well as with some of the simplified methods in current favor such as Newtonian, tangent-wedge, equivalent-cone, and shock-expansion methods. It is shown that in appropriate applications the thin-shock-layer theory is superior to any of these simplified methods. However, test conditions did not duplicate those necessary for complete evaluation of the improved shock-expansion theory. In certain instances the influence of viscous phenomena on the results is discussed, especially with regard to the distinct wing-body combinations. The pressure tests on the sharp leading-edge wings, bodies, and wing-body combinations were conducted at M~5 and 8 in tunnels A and B of the von Karman Facility of the Arnold Engineering Development Center. The range of test variables were: angles of attack, -10° to 20°; angles of yaw, -15° to 15°; Reynolds numbers, 0.83 to 6.0 x 10^6/ft. (Author)

AD-407 951
Institute [for Aerospace Studies] Univ. of Toronto (Canada)
ASYMMETRY OF ANNULAR JET FLOW IN GROUND PROXIMITY. PART II. A STATIC 60° INWARDLY INCLINED ANNULAR JET AT AN ANGLE OF ATTACK
Paul R. Stephens. Oct 62, 120p
UTIA Technical note no. 63; N63-17557
OTS $9.60

DESCRIPTORS: *Ground effect machines, *Annular nozzles, *Jets, Gas flow, Aerodynamic characteristics, Angle of attack, Photographic analysis, Test equipment.

The simplest of theories presented by other researchers was moderately expanded to include non-zero angles of attack of a static nozzle. The resulting curves were employed for comparisons with some of the experimental results. In conjunction with the theoretical development, some rather extensive experimentation was conducted. This was to encompass a cross-section of the possible combinations of the four effective parameters - height, jet pressure ratio, jet thickness, and angle of attack. Flow patterns on the ground board and in the nozzle plane of flow symmetry were photographed. The total force normal to the nozzle base and the pressure distributions on the nozzle base and on the ground board were measured simultaneously. All of the phenomena associated with an annular flow at zero angle of attack persist through changes in that parameter. In fact, all the measured quantities depend as much on angle of attack as on height above ground. (Author)

AD-407 953
Institute [for Aerospace Studies] Univ. of Toronto (Canada)
THE EFFICIENCY OF ENERGY TRANSFER ASSOCIATED WITH MAGNETICALLY DRIVEN SHOCK WAVES IN A TEE TUBE
J. K. Dukowicz. Apr 63, 51p
Contract AF49(638)823
UTIA Technical note no. 52; AFOSR-2429; N63-17558
OTS $5.60

DESCRIPTORS: *Shock tubes, *Shock waves, Magnetic fields, Energy, Measurement, Schlieren photography

The energy disposal in a shock tube with magnetically driven shock waves was studied. The well known T-tune apparatus was used in the experiment. A technique to measure the energy input was developed involving the simultaneous measurement of the current and the voltage drop across the tube. Schlieren rotating drum camera photographs of the flow provided accurate shock wave trajectories from which the energy contained in the flow was deduced by the use of strong blast wave theory. The efficiency of the T-Tube obtained in this way was found to be approximately 20 percent under a variety of conditions. The use of a backstrap did not change the efficiency but was found to roughly double the amount of energy deposited in the T-Tube. In the range 1 - 10 mm. Hg., no effect of pressure was detected. (Author)

AD-429 413
Institute [for Aerospace Studies] Univ. of Toronto (Canada)
AN EXPERIMENTAL INVESTIGATION OF THE FLOW IN AND BEHIND TWO-DIMENSIONAL JET SHEETS BOUNDING A CAVITY
K. Sridhar. Aug 63, 210p
UTIA rept. no. 94
OTS $14.00

DESCRIPTORS: *Annular nozzles, *Jet mixing flow, Cavitation, Ground effect machines, Gas flow, *Fluid mechanics, Test equipment, Tests.

Experiments with the UTIA test facility for two-dimensional jet sheets bounding a cavity were carried out for six different configurations of nozzles height and lateral position (cavity depth) and at four different pressure ratios. The test program consisted of probing the jet sheets and cavities at various stations. A main finding of this work is that the experimental flow, in a number of respects, is not in conformity with the usual theoretical models. The velocity profiles at different horizontal stations along the "curved" jet sheets were found to be similar provided the stations considered were not too close to the nozzle exit. The experimental results also indicated the flow in the cavity to be highly rotational and that in the region not too close to the boundaries, the vorticity may be approximated as uniform. Further, the total circulation about a specifie circuit in the cavity was found to vary linearly with the theoretical jet Mach number, the slopes of the lines changing with the configuration. (Author)

AD-419 146
Institute [for Aerospace Studies] Univ. of Toronto (Canada)
LANGMUIR PROBE MEASUREMENTS IN THE STAGNATION POINT BOUNDARY LAYER OF A BLUNT-NOSED BODY IN A SUPERSONIC PLASMA FLOW
A. A. Sonin. Jun 63, 46p
UTIA Technical note no. 58; AFOSR-2430; N63-22413
OTS $4.60

DESCRIPTORS: *Boundary layer, *Stagnation point, *Plasma jets, *Blunt bodies, Supersonic flow, Gas ionization, Electron density, Theory, Experimental data, Plasma physics.

Langmuir probes have been used to traverse the boundary layer at the stagnation point of a blunt-nosed body in a supersonic plasma stream, and the experimental profiles of electron number density compared to the predictions of theory. The agreement of experiment and theory has been shown to be fairly good, although the lack of an accurate method of temperature measurement prevented a conclusive comparison. (Author)

AD-426 849
Institute [for Aerospace Studies] Univ. of Toronto (Canada)
NONEQUILIBRIUM EXPANSION FLOW OF DISSOCIATED OXYGEN AROUND A CORNER
I. I. Glass and A. Takano. Jun 63, 171p
UTIA rept. no. 91; AFOSR-5441; N64-13964
OTS $12.50

DESCRIPTORS: *Gas flow, *Dissociation, *Oxygen, Aerodynamic configurations, Thermodynamics, Shock waves, Partial differential equations, Recombination reactions, Numerical analysis

A detailed study is presented of the nonequilibrium inviscid expansion flow of dissociated oxygen around a corner. The nonlinear partial differential characteristic equations were solved on an IBM-7090 computer for a number of cases with different free-stream conditions and wall deflection angles. Of special interest is the flow generated by a shock wave moving at a Mach number of 12 into pure oxygen at a pressure of 20 mm Hg, producing a degree of dissociation of about 20 percent at a temperature of about 3,700°K. It was found that the flow produced by the corner consists of seven basic flow areas, some of which are quite complex. The existence of a recombination shock wave at the tail of the expansion wave was verified. The shock wave is quite weak but increases in strength with larger wall deflection angles. For a given wall angle the shock wave is strongest near the corner and decays with increasing radial distance from the corner. (Author)

AD-429 222
Institute for Aerospace Studies, Univ. of Toronto (Canada)
NONEQUILIBRIUM EXPANSION FLOW OF IONIZED ARGON AROUND A CORNER
I. I. Glass and A. Takano. Sep 63, 100p
UTIAS rept. no. 95; AFOSR-5446
OTS $8.60

DESCRIPTORS: *Gas flow, *Gas ionization, *Argon, Aerodynamic configurations, Thermodynamics, Shock waves, Partial differential equations, Recombination reactions, Numerical analysis,

A detailed study is presented of nonequilibrium, inviscid expansion flows of ionized argon around a corner. The calculating procedure is based on the method of characteristics and is similar to that for dissociating oxygen in a separate UTIA report AD-426 849). The numerical computations were performed on an IBM-7090 computer for a number of cases with different free-stream conditions and wall angles. It was assumed that, in the temperature range considered, the internal electronic excitation was always at its ground state and atoms, ions and electrons had the same translational temperature. The overall flow pattern obtained was found to be qualitatively similar

to that of dissociating oxygen. However, an important exception was the non-existence of a deexcitation shock wave, which was verified even up to large wall angles and even when using a small size of characteristic mesh. Quasi-similarities of the variations of the flow quantitites along the wave head and along the wall surface also were found to exist, when their appropriately normalized values were plotted as functions of relevant distances. (Author)

AD-407 952
Institute [for Aerospace Studies] Univ. of Toronto (Canada)
PERFORMANCE AND OPERATION OF QUASI TWO-DIMENSIONAL JET FLAPS
G. K. Korbacher. Apr 63, 53p
Grant DA TC-44-177-GI
UTIA rept. no. 90; N63-17600
OTS $5.60

DESCRIPTORS: *Jet flaps, *Flaps, Aircraft equipment, Boundary layer control systems, Aerodynamic characteristics, Mathematical analysis, Experimental data, Wings, Drag.

Part I of this note scrutinizes the experimental evidence for and verification of the once much disputed jet flap thrust hypothesis. It is shown to be true experimentally as conclusively as it is proven by theory. Part II presents the development of a "Jet Flap Characteristics" for truly and quasi 2-dimensional jet flapped wings. For a specific lift, it permits to read off any number of combinations of rate of blowing, jet deflection angle and angle of attack, which produces this lift. Consulting the characteristics simultaneously for the corresponding drag and thrust values adds performance and economy of operation criteria to the picture. Optimizing the production of a specific lift with respect to the lowest expenditure in blowing at the smallest possible drag results in an "operating Line" for jet flapped wings. Besides, some simple semi-empirical relationships could be derived from these jet flap characteristics which permit to supplement characteristics substantially beyond measured test points, provided some basic "Constants" of the jet flapped wing are known from test results. (Author)

AD-419 145
Institute [for Aerospace Studies] Univ. of Toronto (Canada)
PRESSURE MEASUREMENT IN TRANSITION AND FREE MOLECULAR FLOWS USING ORIFICE PROBES
J. C. Lafrance. Jun 63, 39p
Contract AF33(616)6990
UTIA Technical note no. 67; N63-22671
OTS $3.60

DESCRIPTORS: *Superaerodynamics, *Gases, Subsonic flow, Molecules, Orifices, Cylindrical bodies, Flat plate models, Kinetic theory, Aerodynamic characteristics, Measurement

When bodies travel in a gas so rarefied that the mean-free-path of the molecules is much larger than any of the dimensions of the body the aerodynamic properties of the body can be calculated using kinetic theory ignoring the collision between the molecule that have struck the body and those directed towards it. At slightly higher densities such collisions start to become of importance and deviations from the free-molecular theoretical results will occur. This report describes a series of experiments performed in a rotating arm apparatus to study the deviations from free-molecular flow that occur at low subsonic speeds. The specific criterion used in these tests was the pressure measured by an orifice probe in the walls of cylinders and flat plates of rectangular and circular shape which were perpendicular to the flow direction. It was found that the deviations from free-molecular flow depend on both dimensions perpendicular to the flow in relation to the mean-free-path and on the speed ratio. (Author)

AD-419 307
Institute [for Aerospace Studies] Univ. of Toronto (Canada)
SODIUM LINE REVERSAL TEMPERATURE MEASUREMENTS IN SHOCK-TUBE FLOWS
W. H. Mak. May 63, 86p
UTIA Technical note no. 66; N63-19188
OTS $8.10

DESCRIPTORS: Shock waves, *Shock tubes, *Temperature, Measurement, *Sodium, *Line spectrum, Excitation, *Gas flow, Light pulses, Boundary layer, Photomultipliers.

The sodium line reversal method was applied to study the electronic excitation (vibrational) temperature profiles behind moving normal shock waves in nitrogen and air in a 3 in. x 3 in. shock tube. The temperature range was approximately between 2300°K and 2600°K at shock Mach numbers between 6.5 and 6.9 and initial gas pressures of 3 and 4 mm. Hg. The effects of the finite light source and the cool boundary layer have been considered. Satisfactory agreement between observed and theoretical values of the temperature was obtained for shock waves in nitrogen. The results in air in general gave temperatures higher than the calculated values. The recording apparatus had a rise time of 3 μs and the precision of measurement was limited by the photomultiplier noise level to the order of 2%. The effect of the boundary layer was found significant in comparison with the error of the measurement. Greater precision could have been achieved by using a phototube of lower noise level, but it would still be limited by the fluctuations in the sodium population in the hot flow. (Author)

NASA-TN-D-2199
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
HEAT TRANSFER TO A DELTA-WING-HALF-CONE COMBINATION AT MACH NUMBERS OF 7 AND 10
James C. Dunavant. Mar 64, 33p
N64-15973
OTS $1.00

NASA-TN-D-2201
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF BLUNTED CONES AT MACH NUMBERS OF 3.5, 4.2, AND 6.0.
J. Wayne Keyes. Feb 64, 64p
N64-15404
OTS $1.75

NASA-TR-R-191
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
SOME EFFECTS OF FLIGHT PATH AND ATMOSPHERIC VARIATIONS ON THE BOOM PROPAGATED FROM A SUPERSONIC AIRCRAFT
Raymond L. Barger. Feb 64, 31p
N64-15406
OTS $0.75

NASA-TN-D-2166
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
PREDICTION OF AERODYNAMIC PENALTIES CAUSED BY ICE FORMATIONS ON VARIOUS AIRFOILS
Vernon H. Gray. Feb 64, 21p
N64-15162
OTS $0.50

METALLURGY

AD-258 935
Aeronautical Materials Lab., Naval Air [Engineering] Center, Philadelphia, Pa.
COATINGS FOR MOLYBDENUM. Summary rept. for Apr 58-Sep 60
Robert G. Mahorter, Jr. 1 May 61, 20p
Rept. no. NAMC-AML-1234
OTS $1.60

DESCRIPTORS: *Molybdenum, Coatings, *Metal coatings, Chromium, Nickel, *Refractory coatings, Silicon, Aluminum compounds, Oxides, Molybdenum compounds, Sulfides, Thermal stresses, Jet engines,

The relative thermal shock resistance in air, under stress, of eight protective coatings were evaluated. The temperature cycle used was 1800°F to 200°F and the stress was 45,000 psi. Specimens were tested until failure or 500 cycles occurred. Specimens which performed well during the 1800°F to 200°F cycle were tested using a 2000°F to 300°F cycle. (Author)

BM-RI-6259
Albany Metallurgy Research Center, Ore.
METALLOTHERMIC REDUCTION OF YTTRIUM HALIDES
R. E. Mussler, T. T. Campbell, E. E. Black, and G. B. Robidart. Sep 62, 24p
Contract AT(11-1)599
OTS $2.60

DESCRIPTORS: *Halides, *Yttrium.

DRI-2090
Denver Research Inst., Colo.
AN INVESTIGATION OF THE EFFECT OF METALLIC ADDITIONS UPON THE OXIDATION RESISTANCE OF TITANIUM-MODIFIED $NbAl_3$.
Quarterly progress rept. no. 2, 1 Dec 62-28 Feb 63.
Walter Wheatfall. Mar 63, 11p
Contract AT(11-1)1092
OTS $1.60

DESCRIPTORS: *Aluminum alloys, *Niobium alloys, *Titanium alloys, *Tin alloys, Oxidation.

AD-420 524
General Dynamics/Astronautics, San Diego, Calif.
SELECTION OF OPTIMUM MATERIALS FOR USE IN LIQUID-HYDROGEN-FUELED AEROSPACE VEHICLES. Final rept., Jul 62-Jul 63
J. L. Christian and J. R. Kerr. Oct 63, 198p
Contract AF33(657)9445
GD/A rept. no. AE62-0867-3; ASD-TDR-63-798
OTS $3.00

DESCRIPTORS: *Aerospace craft, Rocket motors (Liquid propelled), Liquefied gases, Hydrogen, *Low-temperature alloys, *Tin alloys, *Nickel alloys, *Cobalt alloys, Mechanical properties, Environmental tests,

The mechanical properties of ten thin-gauge titanium, nickel and cobalt-base alloys and stainless steels were determined from -423° to 800°F. From these data and literature information, four alloys were selected for intensive studies to determine the effect of various thermal exposures on mechanical properties. The alloys selected were Hastelloy X, Ti-13V-11Cr-3Al, Type 301 stainless steel, and Ti-5Al-2.5Sn ELI. 100-hour thermal and oxidation exposures at several elevated temperatures and thermal cyclic exposures were included for each of the alloys, and hydrogen exposures at elevated temperatures for the Ti-5Al-2.5Sn ELI alloy. The data are presented in tabular and graphic form and their significance is discussed. Descriptions of test equipment, experimental procedure, test specimens, and chemical analyses of alloys are given. (Author)

LAMS-3022
Los Alamos Scientific Lab., N. Mex.
DEOXIDATION OF TANTALUM WITH SOME REACTIVE METALS
Ralph H. Perkins. Nov 63, 34p
Contract W7405-eng-36
OTS $0.75

TID-19007
Massachusetts Inst. of Tech., Cambridge. Div. of Sponsored Research.
THERMODYNAMIC AND OTHER ASPECTS OF METALLIC SYSTEMS. Progress rept. for Jun 62-Jun 63 [1963] 8p
Contract AT(30-1)1002
OTS $1.10

DESCRIPTORS: *Metals, *Thermodynamics, Plasticity, Deformation

NLCO-900
National Lead Co. of Ohio, Cincinnati.
SUMMARY TECHNICAL REPORT, OCTOBER 1-DECEMBER 31, 1963
R. Burgett, ed. 17 Feb 64, 58p
Contract AT(30-1)1156
OTS $1.50

PB-165 143
Rocketdyne, Canoga Park, Calif.
COMPATIBILITY OF MATERIALS WITH HIGH-TEMPERATURE POTASSIUM 6 Jan 60, 145p Prepared in cooperation with Atomics International, Canoga Park, Calif.
Rept. no. R-2090-P; NP-10005
OTS $11.00

DESCRIPTORS: *Rocket propulsion, *Nuclear propulsion, *Heat exchangers, Liquid metals, *Potassium, *Sodium, Corrosion, *Heat-resistant metals and alloys, *Zirconium alloys, *Niobium alloys, *Test facilities.

A detailed presentation is made of a proposed one-year investigation to evaluate refractory materials for potential use in high-temperature turboelectric space powerplants utilizing potassium as the working fluid. The test program includes both isothermal capsule and Rankine loop tests. Consideration is also given to the performance of sodium corrosion studies utilizing the same test loops. (Author)

SCTM-130-63(74)
Sandia Lab., Albuquerque, N. Mex.
NEW HEAT SOURCES AND TECHNIQUES FOR USE IN VACUUM DEPOSITION OF THIN FILMS
C. M. Stover. Jun 63, 13p
Contract AT(29-1)789
OTS. $1.60

DESCRIPTORS: Film, *Vacuum systems.

Light Metals

NASA-CR-30
IIT Research Inst., Chicago, Ill.
DETERIORATION OF SOME ALUMINUM ALLOYS IN THE PRESENCE OF MERCURY AND CESIUM
William Rostoker. Mar 64, 18p
Contract NAS3-2251
Rept. R3501-B41; N64-15968
OTS $0.50

PB-165 177
Michigan Univ., Ann Arbor.
THE INFLUENCE OF SURFACE TREATMENT ON THE FATIGUE PROPERTIES OF TITANIUM AND TITANIUM ALLOYS. Rept. for 31 May 53-15 Jun 54, on Metallic Materials
Lars Thomassen, Maurice J. Sinnott, and Albert W. Demmler, Jr. Oct 54, 43p
Contract AF33(616)26
WADC Technical rept. no. 53-437, Pt. 2; AD-59 643
OTS $4.60

DESCRIPTORS: *Titanium, Titanium alloys, Mechanical properties, Surface properties, *Fatigue (Mechanics),

NUMEC-P-49
Nuclear Materials and Equipment Corp., Apollo, Pa.
FEASIBILITY OF PRODUCING SPHERICAL BERYLLIUM PARTICLES. Final rept.
L. A. Hughes and H. J. Garber. 2 Nov 62, 19p
Contract AT(30-1)2913
OTS $1.60

DESCRIPTORS: *Beryllium, Production,

Nonferrous (except light) Metals

AD-279 667
Colorado School of Mines Research Foundation, Inc., Golden
IMPROVED OXIDATION RESISTANCE OF MOLYBDENUM BY ALLOYING WITH RARE EARTH AND OTHER SELECTED METALS.
Progress rept. no. 1, 1 Nov-31 Dec 61 [1962] 7p
Contract NOw 62-0305-d
OTS $1.10

DESCRIPTORS: *Molybdenum alloys, *Corrosion inhibition, *Rare earth compounds, Oxides, Oxidation.

It was determined experimentally that in the rare earth group of elements (La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, and Lu), the first four form oxides which are to hygroscopic. Of the remainder, only Sm, Ho, and Er, are worthy of further consideration, because the others are either too rare or too expensive. Yttrium, holmium, and erbium molybdates show a great deal of expansion with heating which may be of considerable advantage for the intended use. BeO has no tendency to form a molybdate with MoO_3, so that Be was discarded as a potential alloying material. (Author)

AD-279 694
Colorado School of Mines, Research Foundation, Inc., Golden
IMPROVED OXIDATION RESISTANCE OF MOLYBDENUM BY ALLOYING WITH RARE EARTH AND OTHER SELECTED METALS.
Interim rept. no. 2, 1 Jan-28 Feb 62
Wilbur J. Guay. 26 Mar 62, 6p
Contract NOw 62-0305-d
N63-16175
OTS $1.10

DESCRIPTORS: *Oxides, *Yttrium compounds, *Samarium compounds, *Zirconium alloys, Oxidation, Scale, Semiconductors, *Corrosion inhibition.

Oxidation experiments with Y and Sm showed that these metals formed the anion-deficit semiconductor type of oxide. Y-Zr alloys containing 1, 2, and 4 percent Zr were oxidized in an attempt to produce an oxide scale with less anion deficiency, and hence a lower oxidation rate in accordance with the Wagner-Hauffe concept. The results were negative. (Author)
(See also AD-279 667)

Structural Metallurgy and Corrosion

TID-16561
Knolls Atomic Power Lab., Schenectady, N. Y.
CORROSION IN ENERGY CONVERSION SYSTEMS (NUCLEAR)
Cornelius Groot. 21 Jun 62, 28p
Contract W31-109-eng-52
OTS $2.60

DESCRIPTORS: *Nuclear power plants, *Corrosion,

TID-18952
Rensselaer Polytechnic Inst., Troy, N. Y.
CORROSION CHARACTERISTICS OF THE RARE EARTH AND YTTRIUM METALS
Linda Lee and Norbert D. Greene. [1962] 29p
Contract AT(30-1)1995
OTS $2.60

DESCRIPTORS: *Rare earths, Yttrium.

AD-420 117
Rock Island Arsenal Lab., Ill.
INFLUENCE OF ATMOSPHERIC CONTAMINANTS ON CORROSION; LITERATURE REPORT
Harry C. Muffley, 13 Jun 63, 25p
Rept. no. 63-2041; N63-22437
OTS $0.75

DESCRIPTORS: *Corrosion inhibition, Corrosion, *Atmospheric pollution, Steel, Contamination,

Corrosion preventive coatings are currently designed to prevent moisture from coming in contact with the metal surfaces. Corrosion due to moisture and atmospheric contaminants accelerates the rate of corrosion. The fact that these two, mositure and atmospheric contaminants, vary independently, makes it difficult to predict the corrosion behavior of a given area. Literature in this field of endeavor was reviewed with the following questions in mind: (1) What contaminants contribute to atmospheric corrosion? (2) What is the mechanism of atmospheric corrosion? (3) What techniques are available for determining atmospheric contamination? Included are 68 references. (Author)

DP-801
Savannah River Lab., Aiken, S. C.
CORROSION RESULTS FROM THE HEAVY WATER COMPONENTS TEST REACTOR
J. Malvyn McKibben. Jan 64, 32p
Contract AT(07-2)1
OTS $0.75

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

ANL-6797
Argonne National Lab., Ill.
INTERNATIONAL CONFERENCE ON NUCLEAR PHYSICS WITH REACTOR NEUTRONS, OCTOBER 15-17, 1963. A Topical Conference of the American Physical Society.
F. E. Throw, ed. Nov 63, 488p
Contract W31-109-eng-38
OTS $5.50

WAPD-T-1577
Bettis Atomic Power Lab., Pittsburgh, Pa.
A STABLE AND NON-ITERATIVE SOLUTION TO THE DISCRETE ORDINATES EQUATIONS
E. Schmidt. Apr 63, 10p
Contract AT(11-1)GEN-14
OTS $1.10

DESCRIPTORS: *Neutron transport theory.

BNL-6033
Brookhaven National Lab., Upton, N. Y.
THERMODYNAMICS OF SOLUTIONS OF ACTINIDES AND FISSION PRODUCTS IN BISMUTH
Richard H. Wiswall, Jr. and James J. Egan. 18 Jun 62, 43p
Contract AT(30-2)GEN-16
OTS $4.60

DESCRIPTORS: *Bismuth, *Thermodynamics, *Fission products, *Actinides, Rare earths.

NYO-10562
Carnegie Inst. of Tech., Pittsburgh, Pa.
OBSERVATION OF RADIATIVE CAPTURE OF MUONS IN COPPER
William T. Chu. Jan 63, 124p
Contract AT(30-1)882
OTS $10.10

DESCRIPTORS: *Copper, *Meson capture, Muons.

HW-79054
Hanford Atomic Products Operation, Richland, Wash.
PHYSICS RESEARCH. Quarterly rept. Jul-Sep 63.
15 Oct 63, 89p
Contract AT(45-1)1350
N64-15200
OTS $2.25

IS-425
Institute for Atomic Research, Iowa State Univ. of Science and Tech., Ames
RADICAL AND MOLECULAR REACTION MECHANISMS FOR (γ, n) ACTIVATED C^{11} REACTIONS IN LIQUID CYCLOHEXANE
Edward P. Rack and Adolf F. Voigt. 28 Mar 62, 27p
Contract W7405-eng-82
OTS $2.60

DESCRIPTORS: *Cyclohexanes, *Radiolysis.

UCRL-10099
Lawrence Radiation Lab., Univ. of California, Berkeley.
ANGULAR-MOMENTUM EFFECTS ON NEUTRON EMISSION BY Dy^{156}, Tb^{153}, AND Tb^{157} COMPOUND NUCLEI
Gabriel N. Simonoff and John M. Alexander. 26 Feb 62, 42p
Contract W7405-eng-48
OTS $4.60

DESCRIPTORS: *Dysprosium, *Terbium, *Isotopes,

UCRL-10209
Lawrence Radiation Lab., Univ. of California, Berkeley.
ON COMPLEX ANGULAR MOMENTUM IN MANY-CHANNEL POTENTIAL-SCATTERING PROBLEMS, II
John M. Charap and Euan J. Squires. 3 May 62, 40p
Contract W7405-eng-48
OTS $3.60

DESCRIPTORS: *Scattering,

UCRL-10798
Lawrence Radiation Lab., Univ. of California, Berkeley.
EVIDENCE FOR A NEW REGION OF DEFORMATION WITH LESS THAN EIGHTY-TWO NEUTRONS
Richard N. Chanda. Doctoral thesis. 29 Apr 63, 81p
Contract W7405-eng-48
OTS $2.00

UCRL-10193
Lawrence Radiation Lab., Univ. of California, Berkeley.
KINETIC ENERGY RELEASE IN 23 Mev DEUTERON FISSION OF U^{238}
John M. Alexander, M. F. Gazdik, and Saad Wasif. May 61, 22p
Contract W7405-eng-48
OTS $2.60

DESCRIPTORS: *Uranium, *Isotopes, *Fission, *Deuterons.

UCRL-11125
Lawrence Radiation Lab., Univ. of California, Berkeley.
STUDY OF DYNAMICAL S-MATRIX EQUATIONS WITH REGGE BEHAVIOR
C. Edward Jones. Thesis. 31 Oct 63, 97p
Contract W7405-eng-48
OTS $2.25

UCRL-6707
Lawrence Radiation Lab., Univ. of California, Livermore.
CRITICAL-SIZE CALCULATIONS FOR NEUTRON SYSTEMS BY THE MONTE CARLO METHOD
Donald H. Davis. 12 Dec 61, 27p
Contract W7405-eng-48
OTS $2.60

DESCRIPTORS: *Neutrons, *Monte Carlo method,

UCRL-6930
Lawrence Radiation Lab., Univ. of California, Livermore.
PROTON SCATTERING BY Ni^{64} AND Zn^{64} AT 9.6 AND 11.7 MeV
J. Benveniste, A. C. Mitchell, and C. B. Fulmer. 28 May 62, 28p
Contract W7405-eng-48
OTS $2.60

DESCRIPTORS: Nickel, Isotopes, Zinc, *Proton scattering

LADC-5821
New Mexico Univ., Albuquerque.
FAST NEUTRON INDUCED FISSION OF U^{238}
Michael J. Bennett. Master's thesis. 1963, 64p
OTS $6.60

DESCRIPTORS: *Uranium, Isotopes, *Neutrons, *Fission.

ORNL-TM-562
Oak Ridge National Lab., Tenn.
PRODUCTION OF I^{125} AND FABRICATION OF I^{125} X-RAY SOURCES
H. T. Russell. 19 Jul 63, 8p
Contract W7405-eng-26
OTS $1.10

DESCRIPTORS: *Iodine, *Isotopes, *X-rays

EURAEC-417
Societe Belge de Chimie Nucléaire, Brussels.
PHYSICAL CHEMISTRY OF THE MIGRATION OF THE CATIONS INTO THE GROUND. Special technical rept.
L. Baetsle. Jan 63, 33p
Contract 048-61-4-RDB
EUR-141.f
OTS $3.60

DESCRIPTORS: Soils, *Ion exchange.

TID-18974
Stanford Linear Accelerator Center, Stanford Univ., Calif.
COHERENT PRODUCTION AS A MEANS OF DETERMINING THE SPIN AND PARITY OF BOSONS
S. M. Berman and S. D. Drell. [1962] 13p
Prepared in cooperation with Stanford Univ.
Contract AT(04-3)326
OTS $1.60

DESCRIPTORS: *Bosons, *Parity.

TID-18884
Virginia Polytechnic Inst., Blacksburg, Va.
TIME-DEPENDENT SOLUTION OF THE NEUTRON TRANSPORT EQUATION IN A FINITE SLAB.
Quarterly progress rept. for Sep-Dec 62
Robert L. Bowden, Jr. Doctoral thesis. Jan 63, 139p
Contract AT(40-1)2686
OTS $10.50

DESCRIPTORS: *Neutron transport theory.

Elementary Particles

TID-16216
Argonne National Lab., Ill.
POSSIBLE INTERPRETATIONS OF HIGH-ENERGY CROSS SECTIONS
K. Tanaka. 2 Apr 62, 5p
Contract W31-109-eng-38
UAC-6400
OTS $1.10

DESCRIPTORS: *Mesons, *Nucleons

UCRL-11155
Lawrence Radiation Lab., Univ. of California, Berkeley.
K^- p ELASTIC SCATTERING AT 1.22 BeV/c
John H. Munson. Doctoral thesis. 20 Dec 63, 35p
Contract W7405-eng-48
OTS $1.00

MATT-106
Plasma Physics Lab., Princeton Univ., N. J.
ON A NEW METHOD IN THE THEORY OF IRREVERSIBLE PROCESSES
Edward A. Frieman. 1 Nov 61, 28p
Contract AT(30-1)1238
OTS $2.60

DESCRIPTORS: *Charged particles, Plasma physics, *Irreversible processes.

Instruments and Installations

TID-17839
Argonne National Lab., Ill.
FAST NEUTRON DOSIMETRY FOR RADIATION DAMAGE STUDIES
A. David Rossin and Roland J. Armani. Nov 62, 13p
Contract W31-109-eng-38
UAC-7026
OTS $1.60

DESCRIPTORS: *Fast neutrons, *Radiation damage, *Dosimeters,

TID-17835
Argonne National Lab., Ill.
RING MAGNET POWER SUPPLY RECTIFIER PHASE CONTROL FOR INITIAL ZGS OPERATION
W. F. Praeg. 31 Oct 62, 65p
Contract W31-109-eng-38
OTS $6.60

DESCRIPTORS: *Synchrotrons, *Magnets, *Power supplies

BNL-6726
Brookhaven National Lab., Upton, N. Y.
MODE IDENTIFICATION IN THE IRIS-LOADED WAVEGUIDE OF A RF PARTICLE SEPARATOR.
Internal rept. H. Hahn and H. J. Halama. 14 Jan 63, 23p
Contract AT(30-2)GEN-16
OTS $2.60

DESCRIPTORS: *Waveguides, *Microwave equipment, *Accelerators,

BNL-7378
Brookhaven National Lab., Upton, N. Y.
PERTURBATION TECHNIQUES FOR THE DEFLECTING MODE.
Internal rept.
H. Hahn and H. J. Halama. 22 Aug 63, 25p
Contract AT(30-2)GEN-16
OTS $2.60

DESCRIPTORS: *Linear accelerators.

HW-78268
Hanford Atomic Products Operation, Richland, Wash.
AN ALPHA SCINTILLATION TESTER FOR URANIUM SURFACE CONTAMINATION OF N-REACTOR FUEL
C. N. Jackson, Jr. Jul 63, 22p
Contract AT(45-1)1350
OTS $0.75

HW-66728
Hanford Atomic Products Operation, Richland, Wash.
A PERFORMANCE STUDY OF MINIATURE GLASS DOSIMETERS
P. E. Bramson. 24 Oct 60, 22p
Contract AT(45-1)1350
OTS $2.60

DESCRIPTORS: *Dosimeters.

ORO-491
Isotope Development Lab., Research Triangle Inst., Durham, N. C.
A SENSITIVE TRITIUM MONITOR. Final rept.
Lewis F. Ballard and R. L. Ely, Jr. 31 May 63, 39p
Contract AT(40-1)2513
RTI-2513-T10
OTS $3.60

DESCRIPTORS: *Tritium

UCRL-9967 (Rev.)
Lawrence Radiation Lab., Univ. of California, Berkeley.
NEUTRON DOSIMETRY IN AND AROUND HUMAN PHANTOMS BY USE OF NUCLEAR TRACK EMULSION
Hiroaki Akagi and Richard L. Lehman. Apr 62, 46p
Contract W7405-eng-48
OTS $4.60

DESCRIPTORS: *Dosimeters, *Fast neutrons, Dosage, Diffusion

TID-19016
Michigan Univ., Ann Arbor. Coll. of Literature, Science, and the Arts.
THE UNIVERSITY OF MICHIGAN 83-INCH CYCLOTRON. Progress rept. no. 12, 1 Apr-30 Jun 63
W. C. Parkinson, and R. S. Tickle. Jul 63, 5p
Contract AT(11-1)921
ORA-03763-12P
OTS $1.60

DESCRIPTORS: *Cyclotrons,

TID-16144
Sandia Corp., Albuquerque, N. Mex.
A COMPARISON OF DUST COUNT DATA OBTAINED FROM DIFFERENT MEASURING METHODS
K. A. Smith and R. C. Marsh. 25 Jun 62, 11p
Contract AT(29-1)789
SCDC-2724
OTS $1.60

DESCRIPTORS: Measurement, *Health physics.

SLAC-24
Stanford Linear Accelerator Center, Stanford Univ., Calif.
FIRST AND SECOND ORDER BEAM OPTICS OF A CURVED, INCLINED MAGNETIC FIELD BOUNDARY IN THE IMPULSE APPROXIMATION. Technical rept.
R. H. Helm. Nov 63, 23p
Contract AT(04-3)400
OTS $0.50

WCAP-2128
Westinghouse Electric Corp., Pittsburgh, Pa.
MINIATURE NEUTRON DETECTOR DEVELOPMENT. Final rept.
J. Weisman, ed. Jun 62, 17p
Contract AT(30-1)2827
OTS $1.60

DESCRIPTORS: *Neutron detectors, *Semiconductor devices.

Nuclear Engineering and Power

AGN-TP-42
Aerojet-General Nucleonics, San Ramon, Calif.
FISSION GAS RELEASE FROM CYLINDRICAL FUEL AND FUEL PINS
H. S. Dreyer. [1961] 17p
Contract AT(10-1)880
OTS $1.60

DESCRIPTORS: *Fission products, Diffusion, Beryllium, Uranium(IV), Oxides

APAE-123
Alco Products Inc., Schenectady, N. Y.
TUBE-TO-TUBESHEET WELDING DEVELOPMENT PROGRAMS FOR 30 MEGAWATT PROTOTYPE SODIUM INTERMEDIATE HEAT EXCHANGER AND STEAM GENERATOR. [1963] 109p
Contract AT(11-1)666
OTS $9.10

DESCRIPTORS: Boilers, Welding, *Heat exchangers, Stainless steel, *Liquid metal cooled reactors.

ACNP-63016
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
PATHFINDER ATOMIC POWER PLANT. Technical progress rept. for Jan-Mar 63. 46p
Contract AT(11-1)589
OTS $4.60

DESCRIPTORS: *Stainless steel, Corrosion.

ANL-6773
Argonne National Lab., Ill.
ANALYTICAL STUDY OF THE TRANSFER FUNCTION OF EBR-I MARK IV
Jiro Wakabayashi. Sep 63, 58p
Contract W31-109-eng-38
OTS $1.50

TID-17817
Argonne National Lab., Ill.
INVESTIGATION OF FAST REACTOR SYSTEMS BY A ZONE TECHNIQUE
F. H. Helm. Nov 62, 16p
Contract W31-109-eng-38
UAC-7073
OTS $1.60

DESCRIPTORS: *Fast reactors

TID-17812
Argonne National Lab., Ill.
NONDESTRUCTIVE ANALYSIS OF THE U-235 CONTENT OF NUCLEAR REACTOR FUEL ELEMENTS BY GAMMA RAY SCINTILLATION SPECTROMETRY
N. S. Beyer. Oct 62, 20p
Contract W31-109-eng-38
UAC-7005
OTS $1.60

DESCRIPTORS: *Gamma-ray spectroscopy, *Non-destructive testing, *Reactor fuel elements, *Uranium.

ANL-FGF-399
Argonne National Lab., Ill.
PRELIMINARY IRRADIATIONS OF PuC AND UC-PuC
J. H. Kittel, R. Carlander, L. A. Neimark, O. L. Kruger, and R. C. Lied. Nov 62, 6p
Contract W31-109-eng-38
UAC-7022
OTS $1.10

DESCRIPTORS: *Plutonium, *Uranium, *Carbides, Radiation effects

NAA-SR-9163
Atomics International, Canoga Park, Calif.
INPILE EXPERIMENTS ON RETENTION OF FISSION PRODUCTS IN 500°F SODIUM
W. P. Kunkel, D. M. Elliott, and A. S. Gibson.
30 Jan 64, 61p
Contract AT(11-1)GEN-8
OTS $1.50

NAA-SR-MEMO-8485
Atomics International, Canoga Park, Calif.
RESONANT VIBRATION OF HALLAM NUCLEAR POWER FACILITY SODIUM PUMPS
F. J. Waters. 15 May 63, 8p
Contract AT(11-1)GEN-8
OTS $1.10

DESCRIPTORS: *Liquid metal pumps.

NAA-SR-MEMO-6584
Atomics International, Canoga Park, Calif.
SILVER EUTECTIC APM BONDING DEVELOPMENT
W. R. Jackson. 3 Jul 61, 16p
Contract AT(11-1)GEN-8
OTS $1.60

DESCRIPTORS: *Aluminum alloys, Induction heating, *Cold-working, Reactor fuel elements,

NAA-SR-MEMO-7844
Atomics International, Canoga Park, Calif.
SINGLE ELEMENT SHIPPING CASK FOR PNPF, OMRE, AND EOCR IRRADIATED FUEL ELEMENTS
C. Jones, D. Lew, K. Adler, and J. Marron. 7 Jun 63, 87p
Contract AT(11-1)GEN-8
OTS $8.10

DESCRIPTORS: *Reactor fuel elements, *Transportation.

BBC-118
Brush Berryllium Co., Cleveland, Ohio.
RESEARCH ON MODIFIED BERYLLIDES AS HIGH-TEMPERATURE NUCLEAR MATERIALS. Quarterly progress rept. for 1 Dec 62-28 Feb 63
R. M. Paine, A. J. Stonehouse, and W. W. Beaver. 31 Mar 63, 15p
Contract AT(33-3)20
OTS $1.60

DESCRIPTORS: *Berryllium alloys, *Zirconium alloys, *Reactor materials.

TID-18978
Engineering Research Labs., Columbia Univ., New York.
BASIC EXPERIMENTAL STUDIES OF BOILING FLUID FLOW AND HEAT TRANSFER AT ELEVATEI PRESSURES: Monthly progress rept. for May 63
Bruce Matzner. 31 May 63, 31p
Contract AT(30-3)187
MPR-XIII-5-63
OTS $3.60

DESCRIPTORS: Water, *Fluid flow, Pipes, *Heat transfer

GA-4002
General Atomic Div., General Dynamics Corp., San Diego, Calif.
GRAPHITE-MATRIX NUCLEAR FUEL SYSTEMS FOR THE PEACH BOTTOM HTGR
D. V. Ragone, W. V. Goeddel, and L. R. Zumwalt. 20 Feb 63, 128p
Contract AT(04-3)314
OTS $10.10

DESCRIPTORS: Thorium, Uranium, Carbides, *Reactor fuel elements.

GAMD-2605(Rev. 2)
General Atomic Div., General Dyanmics Corp., San Diego, Calif.
PRIMARY COOLANT SYSTEM BLOWDOWN ACCIDENT FOR PEACH BOTTOM HTGR
J. A. Landoni and M. L. Skinner. 15 Dec 62, 125p
Contract AT(04-3)314
OTS $10.10

DESCRIPTORS: *Reactor accidents

GAMD-3269
General Atomic Div., General Dynamics Corp., San Diego, Calif.
TEMPERATURE DISTRIBUTION IN EBOR FUEL RODS DUE TO NON-UNIFORM CIRCUMFERENTIAL COOLING
R. Katz. 29 Jun 62, 30p
Contract AT(04-3)187
OTS $2.60

DESCRIPTORS: *Reactor fuel rods.

GEMP-Z70C
General Electric Co., Cincinnati, Ohio.
HIGH-TEMPERATURE MATERIALS AND REACTOR COMPONENT DEVELOPMENT PROGRAMS: VOLUME III. INSTRUMENTATION AND CONTROLS. Annual rept. no. 3. 28 Feb 64, 43p
Contract AT(40-1)2847
OTS $1.00

GEAP-4218
General Electric Co., San Jose, Calif.
DEVELOPMENT PROGRAM FOR INCREASED OUTPUT IN THE GARIGLIANO NUCLEAR REACTOR. Quarterly rept. no. 2.
E. P. Quinn. 1 Apr 63, 26p
Contract AT(04-3)189
EURAEC-643
OTS $2.60

DESCRIPTORS: *Power reactors, Nuclear power plants.

GEAP-4001
General Electric Co., San Jose, Calif.
HIGH POWER DENSITY DEVELOPMENT PROJECT. Quarterly progress rept. no. 7, Oct-Dec 61.
R. L. Holladay. 1 Jan 62, 64p
Contract AT(04-3)361
OTS $6.60

DESCRIPTORS: *Reactor fuel elements, *Power reactors

GEAP-3828
General Electric Co., San Jose, Calif.
N. S. SAVANNAH FUEL DESIGN AND DEVELOPMENT PROGRAM. FINAL EVALUATION OF THE THERMAL-HYDRAULIC PERFORMANCE OF CORE II
A. P. Bray. Oct 62, 45p
Contract AT(04-3)189
OTS $4.60

DESCRIPTORS: *Pressurized water reactors, Reactor cores.

TID-18996
Geoscience Ltd., Solano Beach, Calif.
HIGH ACCELERATION FIELD HEAT TRANSFER FOR AUXILIARY SPACE NUCLEAR POWER SYSTEMS. Quarterly technical rept. for 1 Mar-31 May 63.
H. F. Poppendiek, N. D. Greene, F. R. MacDonald, C. M. Sabin, and R. K. Livett. [1963] 22p
Contract AT(04-3)409
GLR-14
OTS $2.60

DESCRIPTORS: *Heat transfer.

HW-79205
Hanford Atomic Products Operation, Richland, Wash.
DOME SEAL PERFORMANCE TESTS
D. H. White. Nov 63, 37p
Contract AT(45-1)1350
OTS $1.00

HW-62422
Hanford Atomic Products Operation, Richland, Wash.
EFFECT OF IRRADIATION UPON MECHANICAL PROPERTIES OF ZIRCALOY-2
A. L. Bement and D. L. Gray. 4 Sep 59, 9p
Contract AT(45-1)1350
OTS $1.10

DESCRIPTORS: *Zirconium alloys, Radiation effects,

HW-70178(Rev.)
Hanford Atomic Products Operation, Richland, Wash.
FLUID MIXING EXPERIMENTS WITH A WIRE-WRAPPED 7-ROD BUNDLE FUEL ASSEMBLY
E. D. Waters. Nov 63, 33p
Contract AT(45-1)1350
OTS $1.00

HW-66266 (Suppl. 1) (Rev)
Hanford Atomic Products Operation, Richland, Wash.
HAZARDS SUMMARY REPORT FOR THE HANFORD PLUTONIUM CRITICAL MASS LABORATORY. SUPPLEMENT NO. 1: THE REMOTE SPLIT-TABLE MACHINE.
C. R. Richey, E. D. Clayton, R. H. Odegaarden, J. D. White, and W. A. Reardon. Oct 63, 55p
Contract AT(45-1)1350
OTS $1.25

HW-79669
Hanford Atomic Products Operation, Richland, Wash
MODERATOR LEVEL CONTROL IN THE PLUTONIUM RECYCLE TEST REACTOR
J. F. Fletcher and R. I. Smith. Dec 63, 32p
Contract AT(45-1)1350
ORS $1.00

HW-SA-2937
Hanford Atomic Products Operation, Richland, Wash.
NPR SAFETY AND CONTROL CIRCUITS
G. H. Strong. 5 Mar 63, 46p
Contract AT(45-1)1350
OTS $4.60

DESCRIPTORS: *Reactor safety systems, Reactor control.

HW-SA-2938
Hanford Atomic Products Operation, Richland, Wash.
THE N-REACTOR FUEL PIECE CHARGING MACHINE
H. D. Lenkersdorfer and G. H. Strong. 6 Feb 63, 31p
Contract AT(45-1)1350
OTS $3.60

DESCRIPTORS: *Reactor fuel elements.

NASA-TN-D-2124
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
TWO-DIMENSIONAL GRAY-GAS RADIANT HEAT TRANSFER IN A COAXIAL-FLOW GASEOUS REACTOR
Robert G. Ragsdale and Thomas H. Einstein.
Feb 64, 31p
N64-15909
OTS $0.75

MND-1123
Martin-Marietta Corp., Baltimore, Md.
RADIOSOTOPE FUELED AUXILIARY POWER UNIT. Quarterly progress rept. no. 2, Apr-Jul 57. [1957] declassified 4 Dec 62, 76p
Contract AT(30-3)217
OTS $7.60

DESCRIPTORS: Photographic film, Radiation effects, *Thermoelectric generators, Spacecraft.

MND-P-3001
Martin-Marietta Corp., Baltimore, Md.
RADIOISOTOPE FUELED AUXILIARY POWER UNIT. Quarterly progress rept. no. 4, Oct 57-Jan 58. [1958] declassified. 73p
Contract AT(30-3)217
OTS $7.60

DESCRIPTORS: *Thermoelectric generators, Spacecraft, Power supplies.

MND-P-3002
Martin-Marietta Corp., Baltimore, Md.
RADIOISOTOPE FUELED AUXILIARY POWER UNIT. Quarterly progress rept. no. 5, Jan-Apr 58 [1958] declassified 4 Dec 62, 60p
Contract AT(30-3)217
OTS $5.60

DESCRIPTORS: *Thermoelectric generators, Spacecraft.

MND-P-3003
Martin-Marietta Corp., Baltimore, Md.
RADIOISOTOPE FUELED AUXILIARY POWER UNIT. Quarterly progress rept. no. 6, Apr-Jul 58. [1958] declassified 4 Dec 62. 125p
Contract AT(30-3)217
OTS $10.10

DESCRIPTORS: *Thermoelectric generators, Spacecraft, Power supplies.

MND-P-3004
Martin-Marietta Corp., Baltimore, Md.
RADIOISOTOPE FUELED AUXILIARY POWER UNIT. Quarterly progress rept. no. 7, Jul-Sep 58. 1958, declassified, 116p
Contract AT(30-3)217
OTS $9.60

DESCRIPTORS: *Thermoelectric generators, Space-craft

MND-P-3008
Martin-Marietta Corp., Baltimore, Md.
RADIOISOTOPE FUELED AUXILIARY POWER UNIT.
Quarterly progress rept. no. 11, Jul-Sep 59. [1959] declassified 4 Dec 62. 144p
Contract AT(30-3)217
OTS $11.00

DESCRIPTORS: *Thermoelectric generators, Spacecraft, Power supplies.

MND-P-3009
Martin-Marietta Corp., Baltimore, Md.
RADIOISOTOPE FUELED AUXILIARY POWER UNIT.
Quarterly progress rept. no. 12, Sep-Dec 59.
31 Mar 60, declassified 4 Dec 62. 115p
Contract AT(30-3)217
OTS $9.60

DESCRIPTORS: *Thermoelectric generators, Spacecraft.

MND-P-1175
Martin-Marietta Corp., Baltimore, Md.
RADIOISOTOPE FUELED AUXILIARY POWER UNIT: PIED PIPER APU. Quarterly progress rept. no. 3, 1 Jul-1 Oct 57. Oct 57, declassified 4 Dec 62. 51p
Contract AT(30-3)217
OTS $5.60

DESCRIPTORS: *Thermoelectric generators, Spacecraft, Power supplies.

MITNE-34
Massachusetts Inst. of Tech., Cambridge.
MODIFICATIONS TO FUEL CYCLE CODE "FUELMOVE"
J. A. Sovka and M. Benedict. 15 Apr 63, 44p
Contract AT(30-1)2073
NYO-9717
OTS $4.60

DESCRIPTORS: *Reactors, *Thermal neutrons, Neutron flux, Programming (Computers).

PRDC-TR-61
Power Reactor Development Co., Detroit, Mich.
MONTHLY TECHNICAL REPORT. Rept. for Jul 62. [1962] 16p
Contract AT(11-1)476
OTS $1.60

DESCRIPTORS: Reactor shielding materials, Heat transfer, *Breeder reactors, Reactor safety systems, Reactor kinetics.

AD-420 282
Radiation Effects Information Center, Columbus, Ohio.
THE EFFECT OF NUCLEAR RADIATION ON METALLIC FUEL MATERIALS
A. S. Bauer, M. S. Farkas, and V. W. Storhok.
30 Sep 63, 145p
Contract AF33(657)10085
REIC rept. no. 29
OTS $2.50

DESCRIPTORS: *Radiation effects, Fuels, *Reactor fuels, Metals, Stability, Uranium, Plutonium, Thorium, Mechanical properties.

The effect of nuclear radiation on the properties of metallic fuels, uranium, thorium, plutonium, and their alloys is one which imposes certain limitations on the use of the uranium- and plutonium-bearing materials as reactor fuels. The most pronounced effect is radiation instability, which results both from growth and swelling during radiation. These radiation-induced changes manifest themselves as dimentional changes and decreases in density. Data are presented that summarize the effect of alloying elements, radiation conditions, and prior fabrication and thermal history on dimensional-stability properties. Data summarizing the effect of iradiation on the physical and mechanical properties of these metallic fuels are also given. (Author)

TID-16085
Rensselaer Polytechnic Inst., Troy, N. Y.
TRANSIENTS IN PULSED MODERATORS
P. B. Daitch and D. B. Ebeoglu. 6 Apr 62, 25p
[Contract AT(30-3)328]
LINAC-3
OTS $2.60

DESCRIPTORS: *Reactor moderators, *Neutron transport theory

TID-17004
Royal Research Corp., Hayward, Calif.
THE CESIUM-137 POWER PROGRAM. Quarterly rept. no. 3. 31 Oct 61, 100p
Contract AT(04-3)366
RRC-0102
OTS $8.60

DESCRIPTORS: Cesium, Isotopes, *Thermoelectric generators.

DPST-63-69-6
Savannah River Lab., Aiken, S. C.
EFFECT OF ROD SPACING ON HEAT TRANSFER BURNOUT. USAEC-AECL COOPERATIVE PROGRAM. Quarterly progress rept. for Mar-May 63
R. H. Towell. [Jun 63] 21p
Contract AT(07-2)1
OTS $2.60

DESCRIPTORS: *Reactor fuel elements, Heat transfer, Heavy water reactors.

DP-885
Savannah River Lab., Aiken, S. C.
HEAVY WATER MODERATED POWER REACTORS. Progress rept. Nov-Dec 63.
R. R. Hood, comp. Jan 64, 40p
Contract AT(07-2)1
OTS $1.00

SRO-84
Savannah River Operations Office, Atomic Energy Commission, Augusta, Ga.
HEAVY WATER POWER REACTOR PROGRAM.
Monthly progress rept. for Jun 63 [1963] 9p
OTS $1.10

DESCRIPTORS: *Reactor fuel elements, *Heavy water reactors

SRO-95
Savannah River Operations Office, Atomic Energy Commission, Augusta, Ga.
HEAVY WATER POWER REACTOR PROGRAM.
Monthly progress rept. for Oct 63. [1963] 10p
OTS $1.10

TID-19001
Savannah River Lab., Aiken, S. C.
HWCTR CONTROL ROD AND SAFETY ROD DRIVE SYSTEMS
S. H. Kale. [Jul 63] 27p
Contract AT(07-2)1
OTS $2.60

DESCRIPTORS: *Heavy water reactors.

GEAP-4137
Vallecitos Atomic Lab., General Electric Co., San Jose, Calif.
ACCURATE NUCLEAR FUEL BURNUP ANALYSES.
Quarterly progress rept. no. 4, Sep-Nov 62.
B. F. Rider, C. P. Ruiz and J. P. Peterson, Jr.
Contract AT(04-3)189
OTS $2.60

DESCRIPTORS: *Fission products, *Reactor fuel elements, *Reactor fuels

Nuclear Reactions

PB-165 200
High-Energy Physics Lab., Stanford Univ., Calif.
POSITRON-PROTON SCATTERING
A. Browman, F. Liu, and C. Schaert. Dec 63, 9p
Rept. no. HEPL-319
OTS $1.10

DESCRIPTORS: *Nuclear scattering, Elastic scattering, *Proton scattering, Electrons, *Beta particle reactions, *Positrons, Nuclear cross sections.

The ratios of the cross sections for elastic electron proton and positron proton scattering were measured at two momentum transfers: 3.5 and 19.5 F^{-2}.

UCRL-10312
Lawrence Radiation Lab., Univ. of California, Berkeley.
EXCITATION FUNCTION FOR THE C^{12} (π^-, π^- m) C^{11} REACTION
Paul L. Reeder and Samuel S. Markowitz. 18 Jun 62, 10p
Contract W7405-eng-48
OTS $1.10

DESCRIPTORS: *Carbon, *Isotopes, *Meson reactions

UCRL-10118(Rev.)
Lawrence Radiation Lab., Univ. of California, Berkeley.
THE MEAN LIFE OF THE NEUTRAL PI MESON
Hla Shwe, Frances M. Smith, and Walter H. Barkas.
28 May 62, 42p
Contract W7405-eng-48
OTS $4.60

DESCRIPTORS: *Pions.

UCRL-10894
Lawrence Radiation Lab., Univ. of California, Berkeley.
ROLE OF STRNGE-PARTICLE FINAL STATES IN SPIN ANALYSIS OF NUCLEON ISOBARS
Gideon Alexander, Orin Dahl, Laurence Jacobs, Donald H. Miller, and George Kalbfleisch. 1 Jul 63, 9p
Contract W7405-eng-48
OTS $1.10

DESCRIPTORS: *Nuclear isobars, *Nucleons, *Protons.

NASA-TN-D-2170
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
DIRECT REACTION CALCULATION
W. R. Gibbs, V. A. Madsen, J. A. Miller, W. Tobocman, and E. C. Cox. Feb 64, 46p
N64-15329
OTS $1.25

Nuclear Structure

PB-165 201
High-Energy Physics Lab., Stanford Univ., Calif.
THE EXCITATION OF THE GIANT RESONANCE IN C^{12} AND O^{16} BY INELASTIC ELECTRON SCATTERING
J. Goldemberg and W. C. Barber. Jan 64, 37p
Rept. no. HEPL-320
OTS $3.60

DESCRIPTORS: *Nuclei, Carbon, Oxygen, Electron bombardment, *Nuclear scattering, Inelastic scattering, *Nuclear resonance, Nuclear cross sections, Nuclear structure, Nuclear shell models.

The excitation of the electric dipole giant resonance in C^{12} and O^{16} was studied by measuring the spectrum of electrons inelastically scattered at 180°. Experiments were made with incident electrons of 40, 55, and 70 Mev; combining this data with the known photon absorption cross section a form factor for the giant resonance cross section is obtained for momentum transfers up to 120 Mev/c. The form factor for the combined strength of the main giant resonance in C^{12} and O^{16} which is concentrated between 20 and 25 Mev has a very characteristic shape going through a shallow minimum and increasing again with the momentum transfer. A comparison of the data with calculations of Lewis and Walecka using an extended shell model of the giant resonance indicates quantitative agreement, while collective models (such as the Goldhaber-Teller and Steinwedel-Jensen) fail to explain the data. The cross sections display also some fine structure. In C^{12} peaks are seen at 18.1, 19.5, 24, and 34 Mev; in O^{16} the peaks are at 19, 22.5, and 25.5 Mev. (Author)

PB-165 199
High Energy Physics Lab., Stanford Univ., Calif.
FORM FACTORS FOR STRONG M1 TRANSITIONS IN LIGHT NUCLEI
J. Goldemberg, W. C. Barber, F. H. Lewis, Jr., and J. D. Walecka. Feb 64, 11p
Grant AF-AFOSR-62-452
Rept. no. HEPL-317, Revised
OTS $1.60

DESCRIPTORS: *Nuclei, Lithium, Carbon, Magnesium, Silicon, Electron bombardment, *Nuclear scattering, Inelastic scattering, Nuclear cross sections, Nuclear structure, *Nuclear energy levels, Nuclear shell models.

Strong peaks corresponding to magnetic dipole excitation of the nucleus, were observed in the energy spectrum of electrons scattered at 180° from targets of Li^6, C^{12}, Mg^{24}, and Si^{28}. The momentum transfer dependence of the excitation of these peaks was investigated by using primary electrons of 40, 55, and 70 MeV. From the measured cross sections and the Born approximation theory the inelastic form factors can be obtained. The radiative transition probability from the excited state to the ground state gives the first point on the curve of form factor as a function of momentum transfer. In the case of C^{12} a shell model of the magnetic dipole transition gives a form factor curve in fair agreement with the experimental results. (Author)

Radioactivity

TID-16202
Argonne National Lab., Ill.
ALPHA HALF-LIVES OF Po^{216}, At^{217}, AND Rn^{218}
Herbert Diamond and James E. Gindler. May 62, 18p
Contract W31-109-eng-38
UAC-6413
OTS $1.60

DESCRIPTORS: *Polonium, *Astatine, *Radon, *Isotopes, *Alpha decay

NYO-10393
Geophysics Corp. of America, Bedford, Mass.
STUDY OF TECHNIQUES FOR DETERMINING DISTRIBUTION OF RADIOACTIVE MATERIAL DEPOSITED IN THE UPPER ATMOSPHERE. Quarterly status rept. no. 3, 20 Sep-20 Dec 62. [1963] 13p
Contract AT(30-1)2908
OTS $1.60

DESCRIPTORS: *Atmosphere, *Radioactivity

HW-79652
Hanford Atomic Products Operation, Richland, Wash.
EVALUATION OF RADIOLOGICAL CONDITIONS IN THE VICINITY OF HANFORD, JULY-SEPTEMBER, 1963
R. H. Wilson, ed. 15 Nov 63, 30p
Contract AT(45-1)1350
OTS $1.00

HW-73288
Hanford Atomic Products Operation, Richland, Wash.
I^{131} SAMPLING SYSTEM EFFICIENCIES AT PUREX AND REDOX STACKS
J. D. McCormack. 1 Jun 62, 11p
Contract AT(45-1)1350
OTS $1.60

DESCRIPTORS: *Iodine, Isotopes.

PHYSICS

NASA-TN-D-2232
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
IMPACT FLASH AT LOW AMBIENT PRESSURES
Robert W. MacCormack. Mar 64, 21p
N64-16118
OTS $0.50

PB-165 187
Institute of Metals and Explosives Research, Univ. of Utah, Salt Lake City.
TRAPPED DETONATION-INITIATION WAVES IN THE CARD-GAP METHOD
M. A. Cook. 1 Oct 59, 27p
Contract NOrd-17371
AD-232 643
OTS $2.60

DESCRIPTORS: *Explosions, Explosives initiators, *Detonation waves, Shock waves, Propagation, Detonation, Theroy, Photographic analysis,

Detonations in donor charges that are interrupted by inert barriers reform in receptor charges in the time τ and at distances S_2 into receptor charges such that S_2/τ is approximately the acoustic velocity C in the non-reacted explosive. But when the charge length was less than S_2, no initiation occurred with unconfined receptors. However, with certain metals on the terminal end of a receptor of length L_T such that $S_2/2$ L_T S_2 the initiation occurred at the distance X $2L_T$ - S_2 from the donor-receptor barrier plate. Furthermore, using L_T $S_2/2$ and a metal plate on the end of the receptor no initiation occurred with a glass barrier. But initiation occurred again when a metal plate was placed on the exit side of the glass barrier such that the receptor was sandwiched between two metal reflecting plates. Finally, when donor-inert plate shock systems were used on each end of a receptor of length S_2 L_T $2S_2$, two initiations of detonation were observed each fulfilling the condition $S_2/$ C and each knowing its own donor. Photographs of these phenomena are presented and discussed in terms of the two theories extant of the card-gap test. (Author)

LAMS-3011
Los Alamos Scientific Lab., N. Mex.
SELECTED CONTRIBUTIONS TO HIGH PRESSURE RESEARCH FROM THE LOS ALAMOS SCIENTIFIC LABORATORY
Barbara L. Hendry, comp. and ed. 9 Dec 63, 30p
Contract W7405-eng-36
OTS $0.75

Acoustics

GPO-NAS-1.12:138
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
THE PROPAGATION OF PLANE ACOUSTIC WAVES IN RADIATING GAS
Barnett Stone Baldwin, Jr. 1962, 59p
NASA TR R-138; N63-17551
GPO $0.55

DESCRIPTORS: *Atmosphere entry, Heat transfer, *Mechanical waves, *Sound, Propagation, Gases, *Thermal radiation, Nonlinear differential equations,

A study is made of the interaction of thermal radiation with fluid flow in the acoustic approximation. The analysis is developed for the case of a frequency-dependent absorption coefficient of a gas in theraml equilibrium and for quasi-equilibrium radiation. A previously given solution for the case of sinusoidal variations in position of an adjacent wall is used in superposition to find the response for an impulsive motion of the wall. Results are also given for the response to a sudden temperature change of a fixed wall. The validity of the linear approximation of the original nonlinear equations is investigated. The validity of other approximations, used in the derivations, is also examined. (NASA abstract)

Electricity and Magnetism

TID-17830
Argonne National Lab., Ill.
FORCING CIRCUITS FOR ELECTROMAGNETS
J. F. Mech and S. W. Zimmerman. 31 Aug 62, 12p
Contract W31-109-eng-38
OTS $1.60

DESCRIPTORS: *Circuits, *Electromagnetic fields.

TID-19017
Atomic Power Development Associates, Inc., Detroit, Mich.
SODIUM RESISTIVITY METER LOOP. Summary rept. for May 63 [1963] 6p
Contract AT(11-1)865
OTS $1.10

DESCRIPTORS: *Sodium, *Ohmmeters, Transformers, Electric conductivity

TID-18997
Atomic Power Development Associates, Inc., Detroit, Mich.
SODIUM RESISTIVITY METER LOOP. Summary rept. for Jun 63 [1963] 7p
Contract AT(11-1)865
OTS $1.10

DESCRIPTORS: *Sodium, *Ohmmeters, Transformers

NASA-TN-D-2095
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
THREE AND FOUR COIL SYSTEMS FOR HOMOGENEOUS MAGNETIC FIELDS
M. E. Pittman and D. L. Waidelich. Jan 64, 20p
N64-14983
OTS $0.50

NASA-TR-R-170
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
AXIAL AND RADIAL MAGNETIC FIELDS OF THICK, FINITE-LENGTH SOLENOIDS
Gerald V. Brown, Lawrence Flax, Eugene C. Itean, and James C. Laurence. Dec 63, 100p
N64-15331
OTS $2.25

Electronics

TID-16215
Argonne National Lab., Ill.
RF OSCILLATIONS AND POWER OUTPUT IN ALKALINE THERMIONIC CONVERTERS
H. K. Richards. Apr 62, 22p
Contract W31-109-eng-38
UAC-6389
OTS $1.60

DESCRIPTORS: *Thermionic converters, *Plasma oscillations

N64-13056
Institute for Fluid Dynamics and Applied Mathematics, Univ. of Maryland, College Park.
ON THE "TEST PARTICLE" PROBLEM FOR AN ELECTRON PLASMA
D. A. Tidman and David Montgomery. Dec 63, 9p
Grant NsG-220-62
Technical note BN-342; NASA CR-55147
OTS $1.10

TID-16311
Knolls Atomic Power Lab., Schenectady, N. Y.
PULSED ELECTROSTATIC ANALYZER FOR ION ENERGY DETERMINATIONS
F. A. White, J. C. Sheffield, and P. H. McDonald. 21 May 62, 5p
Contract W31-109-eng-52
OTS $1.10

DESCRIPTORS: *Ion beams, *Pulse analyzers

NASA-TN-D-2187
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
RADIATION FROM SLOTTED-CYLINDER ANTENNAS IN A REENTRY PLASMA ENVIRONMENT
Calvin T. Swift. Feb 64, 62p
N64-15048
OTS $1.75

MATT-121
Plasma Physics Lab., Princeton Univ., N. J.
AN ION ENERGY ANALYZER FOR PLASMA MEASUREMENTS
H. P. Eubank and T. D. Wilkerson. May 62, 34p
Contract AT(30-1)1238
OTS $3.60

DESCRIPTORS: *Ions, Energy, *Plasma physics

Molecular Physics and Spectroscopy

TID-16209
Argonne National Lab., Ill.
A PULSED-MOLECULAR-BEAM MASS SPECTROMETER FOR STUDIES OF ATOMIC AND IONIC IMPACT PHENOMENA ON METAL SURFACES
Manfred Kaminsky. Apr 62, 18p
Contract W31-109-eng-38
UAC-6399
OTS $1.60

DESCRIPTORS: *Mass spectroscopy, *Spectrum analyzers,

NASA-TN-D-2085
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
FORTRAN PROGRAM FOR COMPUTING THE PRINCIPAL MOMENTS OF INERTIA OF A RIGID MOLECULE
Janet G. Ehlers and Glenn R. Cowgill. Feb 64, 45p
N64-15844
OTS $1.25

Solid State Physics

AD-420 363
Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
X-RAY CRYSTALLOGRAPHIC AND POWDER DATA FOR SOME IV A AND V A PHENYL COMPOUNDS. Rept. for Aug 62-May 63, on Materials Analysis and Evaluation Techniques
David W. Fischer. Aug 63, 41p
ASD-TDR-63-673
OTS $1.25

DESCRIPTORS: *Benzenes, *Group IV elements, *Group V elements, Crystal structure, Powders, Statistical data.

Results are shown for X-ray crystallographic and/or X-ray powder diffraction analysis of forty-four phenyl compounds of groups IV A and V A. Crystallographic data includes lattice parameters, space groups, molecules per cell, density, and the indexed powder patterns. (Author)

TID-15759
Argonne National Lab., Ill.
THE CORRELATION OF COLOR AND NON-STOICHIOMETRY
R. J. Thorn and G. H. Winslow. Mar 62, 23p
Contract W31-109-eng-38
UAC-6213
OTS $2.60

DESCRIPTORS: *Uranium, *Oxides, *Color centers.

TID-19705
Digital Computer Lab., Univ. of Illinois, Urbana.
TABLE OF MEASURED TRANSISTOR PARAMETERS FOR CURRENTLY AVAILABLE SILICON NPN TRANSISTORS
Shigeharu Yamada and Hans Bilger. 5 Jun 63, 5p
Contract AT(11-1)1018
OTS $1.60

TID-18947
Emory Univ., Ga.
COPPER MASS ABSORPTION COEFFICIENTS FOR LOW ENERGY X-RAYS
R. W. Carter, G. R. Dyer, and R. H. Rohrer. [1962] 10p
Contract AT(40-1)2953
OTS $1.10

DESCRIPTORS: *Copper, X-ray absorption analysis.

IS-477
Institute for Atomic Research, Iowa State Univ. of Science and Tech., Ames.
ELECTRICAL RESISTIVITY OF RARE-EARTH ALLOYS
F. A. Smidt, Jr. and A. H. Daane. 13 Jul 62, 27p
Contract W7405-eng-82
OTS $2.60

DESCRIPTORS: *Rare earths, *Alloys, *Resistance (Electrical),

N64-13068
Massachusetts Inst. of Tech., Cambridge.
A HIGH SENSITIVITY SOLID STATE LIGHT DETECTOR, Master thesis.
Sanford Cohen. Aug 63, 81p
Grant NsG-254-62
TE-6; DSR-9406 NASA CR-55164
OTS $8.10

NCSC-2663-12
North Carolina State Coll., Raleigh.
URANIUM INTERSTITIAL PHASES. Progress rept. for May 1963
Robert F. Stoops and John V. Hamme. [1963] 19p
Contract AT(40-1)2663
OTS $1.60

PB-165 178
Radio Corp. of America, Harrison, N. J.
SOLID STATE IMAGE INTENSIFIER. Quarterly rept. no. 1, 1 Apr-30 Jun 59
C. P. Hadley and R. W. Christensen. 15 Jul 59, 43p
Contract AF33(616)6360
AD-218 945
OTS $4.60

DESCRIPTORS: *Semiconductor devices, *Image intensifiers (Electronics), *Photoconductivity, Electroluminescence, Light, Amplifiers, Aerial reconnaissance

Efforts are concerned with investigating and improving the materials and construction used in the photoconductor-electroluminescent phosphor-type of solid-state amplifying device to permit its application to low light level aerial reconnaissance. The intensifier with which most of the experimental work was done includes cadmium-sulfide as the photoconductive medium, certain auxiliary layers, and a zinc sulfo-selenide electroluminescent stratum to expose the film in the film-amplifier system. Current efforts were devoted primarily to (1) an analysis of the particular properties the photoconductive and electroluminescent layers must possess to satisfy the requirements of the aerial reconnaissance application, (2) experimental work on photoconductors, (3) experimental work on electroluminescent materials, and (4) experimental work on resolution. (DDC Abstract)

PB-165 179
Radio Corp. of America, Harrison, N. J.
SOLID STATE IMAGE INTENSIFIER. Quarterly rept. no. 4, 1 Jan-31 Mar 60
R. W. Christensen, A. L. Smith, and others.
15 Apr 60, 32p
Contract AF33(616)6360
AD-235 838
OTS $3.60

DESCRIPTORS: *Semiconductor devices, *Image intensifiers (Electronics), *Photoconductivity, Cadmium compounds, Selenides, Light, Amplifiers.

The major effort was devoted to experimental work on photoconductors and to the evaluation of photoconductors for light amplifier use. The purpose of the experimental work on photoconductive materials was to find suitable material for use as the controlling element in the image intensifier. A method of evaluating photoconductors is described, experimental evaluations of data taken on dry and wet processed cadmium selenide photoconductive powders are presented, and the advancements made on the grain problem through the use of spraying technique are shown. (Author) (See also PB-165 178)

AD-290 513
Raytheon Co., Lowell, Mass.
PRODUCTION ENGINEERING MEASURE ON SILICON ALLOY TRANSISTORS. Quarterly rept. no. 1, 25 Jun-30 Sep 62
A. Caggiano, F. M. Dukat, and G. H. Meyner. [1962] 19p
Contract DA36-039-sc-86744
OTS $1.60

DESCRIPTORS: *Semiconductor devices, *Transistors, *Silicon alloys, Preparation, *Quality control, Thin films, Silicone plastics, Thermal stresses

Process changes concerning the materials area and stem configuration are reported along with the appropriate Quality Control measures introduced. Polysiloxane thin films were investigated and the decision to discontinue further work on this approach was made. Results of two experiments are given. One is a temperature step-stress to obtain an indication of reliability direction. The second concerns etching in an attempt to optimize the junctions. (Author)

AD-264 523
Virginia Inst. for Scientific Research, Richmond.
EPITAXIAL FILMS OF METALS AND SEMICONDUCTORS.
Progress rept. no. 3, 18 May-18 Aug 61
[1961] 37p
OTS $3.60

DESCRIPTORS: *Metal films, *Thin films, *Semiconductors, *Germanium, *Vapor plating, Sodium compounds, Chlorides, Magnesium compounds, Oxides, Calcium compounds, Fluorides, *Crystal growth, Epitaxial growth, Optical properties, Electrical properties.

Research has continued using NaCl and MgO as substrates for Ge and an investigation making use of CaF_2 has been initiated. Films deposited on NaCl and MgO have ranged in structure from amorphous to polycrystalline to a mixture of (110), (111), and (100) orientations. Those deposited on CaF_2 have ranged in structure from amorphous to polycrystalline to single crystalline. The single-crystal samples were (111) oriented with twinning. Comparison of continuity and wrinkling of 1500A thick films deposited on three substrates suggest a maximum compressional stress that amorphous or polycrystalline films can withstand. Optical transmission in the 4000A to 10,000A wavelength range indicates that the percent transmission of films on all substrates increases with increasing substrate temperature during deposition. Electrical measurements on a few samples have shown that amorphous films are essentially intrinsic and crystalline films are p-type and have resistivities in the 0.1 to 4 ohm-cm range. Investigation of the transition temperature necessary for a change from the amorphous to the crystalline state has reaffirmed results reported previously. (Author)

TID-16288
Sandia Lab., Albuquerque, N. Mex.
LATTICE STRAIN OF ISOLATED DEFECTS IN ELEMENTAL AND COMPOUNDS SEMICONDUCTORS
Frederick L. Vook. 9 Jul 62, 4p
Contract AT(29-1)789
SCDC-2649
OTS $1.10

DESCRIPTORS: Antimony alloys, Indium alloys, Gallium, Arsenides, *Semiconductors, Radiation effects effects

PB-165 166
Washington Square Coll., New York Univ., N. Y.
ELECTRETS. Quarterly rept. no. 2, 1 Sep-30 Nov 52
J. H. Rohrbaugh. [1952] 22p
Contract AF19(604)407
AD-4544
OTS $2.60

DESCRIPTORS: *Electrets, *Dielectrics,

See also PB-165 117

PB-165 167
Washington Square Coll., New York Univ., N. Y.
ELECTRETS. Quarterly rept. no. 3, 1 Dec 52-28 Feb 53
J. H. RohrBaugh. 1 Mar 53, 13p
Contract AF19(604)407
AD-9521
OTS $1.60

DESCRIPTORS: *Electrets, *Dielectrics,

(See also PB-165 166)

Thermodynamics

TID-17831
Argonne National Lab., Ill.
RADIAL HEAT CONDUCTION IN HOLLOW CIRCULAR CYLINDERS WITH TIME-DEPENDENT BOUNDARY CONDITIONS AND HEAT SOURCES
Nurettin Y. Olcer and David Miller. Oct 62, 21p
Contract W31-109-eng-38
UAC-7018
OTS $2.60

DESCRIPTORS: *Heat transfer,

NASA-TN-D-2117
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
EVALUATION OF SHOCK-TUBE HEAT-TRANSFER EXPERIMENTS TO MEASURE THERMAL CONDUCTIVITY OF ARGON FROM 700° TO 8600° K
Milton R. Lauver, Feb 64, 20p
N64-14985
OTS $0.50

NASA-TN-D-2084
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
A STEADY-STATE ANALYSIS OF THE "LAMINAR-INSTABILITY" PROBLEM DUE TO HEATING PARA-HYDROGEN IN LONG, SLENDER TUBES
David P. Harry III, Feb 64, 39p
N64-14939
OTS $1.00

Wave Propagation

N64-15186
Antenna Lab., Ohio State Univ. Research Foundation, Columbus.
THEORETICAL AND EXPERIMENTAL ANALYSIS OF THE ELECTROMAGNETIC SCATTERING AND RADIATIVE PROPERTIES OF TERRAIN, WITH EMPHASIS ON LUNAR-LIKE SURFACES.
Semi-annual rept., 1 May-31 Oct 63. 1 Nov 63, 26p
Grant NsG-213-61
Rept. 1388-12; NASA CR-55545
OTS $2.60

AD-272 625
Stanford Electronics Labs., Stanford Univ., Calif.
MEASUREMENTS OF AROUND-THE-WORLD HIGH-FREQUENCY PROPAGATION
R. B. Fenwick. Jan 62, 37p
Contract Nonr-225(24)
Technical rept. no. 1004-1; SEL-62-011
OTS $3.60

DESCRIPTORS: High frequency, *Radio waves, *Radio signals, *Propagation, Measurement, Attenuation, *Ionospheric propagation, Ionospheric disturbances, Magnetic storms, Radio transmission.

Systematic studies of round-the-world (RTW) signals, with transmitter and receiver at the same location, were made at Stanford, California, using 50-kw, 1-msec pulse transmissions in the 12- to 28-Mc range, during the period April through October 1961. Information obtained includes average monthly curves of RTW maximum frequency vs time of day, time delay and pulse dispersion as a function of radio frequency, variation of optimum propagation azimuth with time of day, and the degree of degradation of RTW propagation by geomagnetic storms. Predicted curves of average monthly RTW maximum propagating frequency vs time of day were obtained with the aid of National Bureau of Standards world maps, and compared with the measurements. These curves adequately predict certain features of RTW propagation, but provide too low an estimate of the maximum frequency that can propagate at any given time, if ionospheric tilts are neglected. The dominant propagating mode is concluded to be a combination of earth-ionosphere-earth hops on parts of the path, and F2-layer - to - F2-layer hops, made possible by layer tilts, on the remainder of the path. (Author)

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

PB-165 165
Army Library, Washington, D. C.
RESEARCH AND DEVELOPMENT (AND RELATED ASPECTS) IN FOREIGN COUNTRIES. PART A. U.S.S.R. AND OTHER COMMUNIST NATIONS. A SELECTED LIST OF TITLES. 21 Aug 56, 171p
Special Bibliography no. 8; AD-126 906
OTS $12.50

DESCRIPTORS: *Scientific research, *Bibliographies, Communism.

An annotated bibliography is presented on the holdings of the Army Library, and some holdings of the Library of Congress, (published from November 1954 to August 1956) dealing with research and development and related aspects in USSR and other Communist nations. The materials are under headings of general, USSR, Albania, Bulgaria, Czechoslovakia, Eastern Germany, Hungary, Poland, Romania, Yugoslavia, Communist China, North Korea, Outer Mongolia, and Viet Minh, with a breakdown as to subject matter under USSR and China. The publications are listed alphabetically according to title under their respective headings. (DDC abstract)

AD-288 850
[Defense Documentation Center, Alexandria, Va.].
SPEECH COMPRESSION. A DDC REPORT BIBLIOGRAPHY. Bibliography for 1953-1962.
C. C. Hutton, comp. 19 Nov 62, 59p
Rept. no. ARB 13517
OTS $5.60

DESCRIPTORS: *Speech, *Bibliographies, Communication systems, Speech transmission

N64-14896
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-24, VOLUME IV FOR THE PERIOD OCTOBER 1, 1963 TO NOVEMBER 30, 1963. SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT. 31 Dec 63, 289p
Contract NAS7-100
NASA CR-53054
OTS $18.00

GPO-NS-1. 22:In2/960
National Science Foundation, Washington, D. C.
RESEARCH AND DEVELOPMENT IN INDUSTRY, 1960, Final rept. on A Survey of R&D Funds and R&D Scientists and Engineers
Joseph H. Schuster, Richard M. Berry, and Charles A. Heitman. Jan 63, 130p
NSF 63-7
GPO $0.65

DESCRIPTORS: *Industrial research, *Research program administration, Budgets, *Economics, Reviews, Personnel management.

This report analyzes in detail the results of the 1960 survey of industrial research and development, the sixth in the series of industry surveys that began in 1953. These surveys provide economic data on the magnitude, financing, and other characteristics of research and development in industrial firms. (Author)

PB-181 669
Office of Technical Services, Dept. of Commerce, Washington, D. C.
GOVERNMENT-OWNED INVENTIONS AVAILABLE FOR LICENSE ACCUMULATED JANUARY 1963 THROUGH DECEMBER 1963 [1964] 110p
Patent Abstract Series, supplement no. 6
OTS $1.00

DESCRIPTORS: *Patents, United States Government, *Abstracts, Instrumentation, Chemical engineering, Metallurgy, Machines, Transportation, Electrical equipment, Electronic equipment, Ordnance, Ceramic materials, Paper, Rubber, Textiles, Wood, Materials, Manufacturing methods,

For each invention the title of the invention, the United States Patent number, the name of the inventor, the name of the Government agency administering the patent, and an abstract of the patent of the invention are given. Evaluation of the invention with respect to its industrial applications is facilitated by an examination of the technical data contained in the abstract. The following categories are included: Instrumentation; Chemical products and processes; Metal processes and apparatus, machinery, and transportation equipment; Electrical and electronic apparatus; Ordnance; Ceramic, paper, rubber, textile, wood, and other products and processes. (See also PB-181 473)

PB-165 160
Pacific Missile Range, Point Mugu, Calif.
CONTRIBUTIONS TO A STUDY OF MAINTENANCE: CHARACTERIZATION OF CERTAIN REPAIR-COST PROCESSES WITH POISSON-DISTRIBUTED FAILURE INTERVALS
H. Gumbel. 18 Oct 61, 10p
Technical memo. no. PMR-TM-61-19; N63-12811
OTS $1.10

DESCRIPTORS: *Operations research, *Maintenance, Costs, Mathematical models, *Failure (Mechanics), Probability.

In this study, the decision maker is confronted by a stochastic process characterizing the repair intervals and the associated costs and must make appropriate decisions in light of the previously established policy and in the absence of full distributional knowledge of the process. In order to generate suitable processes in the first place and to compare the application of the policy against the theoretically correct solution, the theoretical aspects of some reasonable stochastic processes were studied and are reported herein. It is emphasized that the processes analyzed herein were chosen for convenience, and it is not implied that the present study is exhaustive of all meaningful processes which one might stipulate as underlying the actual phenomena of equipment breakdown and repair. (Author)

PB-165 159
Pacific Missile Range, Point Mugu, Calif.
REPAIR VERSUS REPLACEMENT: A STUDY OF EQUIPMENT MAINTENANCE
H. Gumbel and R. J. Frisbie. 15 Aug 61, 36p
Technical memo. no. PMR-TM-61-12; N63-12810
OTS $3.60

DESCRIPTORS: *Operations research, *Maintenance, Costs, Mathematical models, Errors, Graphic analysis.

The report covers the mathematical foundation for implementing a "repair versus replacement" policy which minimizes the expected total over-all cost at the end of a given, stipulated time, T. The model of repair costs could be kept fairly general so that the procedure should be applicable for a very broad class of actual situations. Specifically, it was assumed that the expected cumulative cost is a convex function of time, differentiable almost everywhere in the domain of interest. A more detailed analysis was made for the specific case where the expected total cost is parabolic. The influence of the parameter T and the effect of errors in estimating this parameter were investigated. (Author)

AD-281 836
RCA Defense Electronic Products, Camden, N. J.
VOCODER EVALUATION STUDIES. Scientific rept. no. 3.
W. F. Meeker and A. L. Nelson. 30 Jun 62 83p
Contract AF19(604)6151
AFCRL 547
OTS $8.10

DESCRIPTORS: *Voice communication systems, *Speech transmission, *Speech recognition, Intelligibility, Telephone communication systems, Air force communications, Coding

Speech transmitted via vocoder suffers peculiar distortions which make evaluation difficult. Three terms often used to describe the performance of a vocoder are intelligibility, speech quality, and talker recognition. The problem of defining these terms is discussed. Intelligibility and talker recognition are susceptible of quantitative comparisons but no technique for measurement on an absolute scale is known. A survey was made of approximately 70 Air Force communications personnel to elicit their judgments of six speech samples representing a range of vocoder systems. Listeners were asked for judgments regarding intelligibility, speech quality, and talker recognition, as well as suitability for normal use and preference. Laboratory measurements were made of intelligibility and talker recognition for the condition represented in the survey and for additional vocoder modifications, including the effects of one, two, and three-bit quantization of the normalized spectrum. (Author)

PB-165 192
Standord Electronics Labs., Stanford Univ., Calif.
PAPERS ON ADAPTIVE SYSTEMS
B. Widrow and G. F. Franklin, comp. May 62, 96p
Contract Nonr-225(24)
Technical rept. no. 2104-2; SEL-62-003
OTS $8.60

DESCRIPTORS: *Adaptive control systems, *Decision making, *Game theory, *Computer logic, Reliability, *Bionics, *Mechanical organs, *Pancreas, *Automatic pilots, Design, Analysis, *Memory, *Nerve cells, Models (Simulations), *Data storage systems,

Contents:
Decision making with strategy improvement in repeated games, by Tom Cover
An adaptive game player for 2x2 zero-sum games, by Richard S. Davies
Adaptive threshold logic, by C. Hugh Mays
A bio-adaptive system: an artificial pancreas, by Gary W. Deley
Analysis and design of an adaptive system for optimizing system-frequency response, by Ralph Pringle, Jr.
Memory in adaptive systems, by David Olsen

SOCIAL SCIENCES

LAMS-3028
Los Alamos Scientific Lab., N. Mex.
SOME ETHICAL AND SOCIAL PROBLEMS OF SCIENCE AND TECHNOLOGY: A BIBLIOGRAPHY OF THE LITERATURE FROM 1955
J. Arthur Freed, comp. 1 Sep 63, 48p
Contract W7405-eng-36
OTS $1.25

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